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THE importance of the question involved is sufficient reason for our again drawing attention to the work of the Coal Waste Commission in Pennsylvania. Messrs. I. A. PRICE, E. B. COXE and P. W. SHEAFER were appointed by the Governor of the State to consider the question of coal waste, and in the nomination of these gentlemen an excellent choice was made, as they are most fully qualified in every way to arrive at sound conclusions and make valuable suggestions for the remedy of the evil. As the Commission has to rely upon the voluntary co-operation of others interested in the subject to bring their work to a satisfactory issue, the best service to this useful end that can be rendered by the press is to give publicity to the topics involved. We therefore append the following divisions of the subject adopted by the Commission for consideration:

GEOLOGICAL AND STATISTICAL WASTE.

Estimate of the original geological coal-field and waste of erosion.
Estimate of existing coal-field before coal mining began.
Estimate of the amount worked to the present year.
Estimate of the total amount that it is possible to take from the earth by any known system of mining, giving the amount that must be left in the ground in shape of pillars, etc., or what may be regarded as permanent structural waste.

WASTE OF PRODUCING AND MARKETING.

Investigation of the underground waste of mining.
Investigation of the waste of preparation, including all processes in which the commercial size has been continually reduced, the amount of culm in sight at place of preparation, and the annual product of culm.
Investigation of the marketing of the pea, buckwheat, bird's-eye or rice, and dust and the uses to which the several sizes or conditions are put.

UTILIZATION OF COAL WASTE.

Examination of the whole Briquette system, duly recorded tests under responsibl supervision, patent office records, specimen forms, and chemical analyses.
Accumulation of the record of all the practical mechanical appliances by which the waste is utilized without mechanical preparation, such as devices of furnaces, grates, blowers, etc., etc.
Investigation of the use of waste after mechanical preparation for combustion, as in pulverized conditions, etc., etc.
Examination of the gasifying processes into water and producer-gas, also in the destruction of garbage or cremating work, also in agricultural experimentation.

With regard to the last division of the subject some useful information will be found by the Commission on Briquette making in France in our issue of August 2d.

WANTED, A LABORATORY OF TECHNICAL RESEARCH.

We are apparently upon the eve of some important discoveries in the metallurgy and physical properties of iron, steel and other metals. In Mr. HOWE'S work on the "Metallurgy of Steel" some account is given of recent developments in alloying steel with other metals, such as manganese, chromium, tungsten and nickel. In Mr. KEEP'S paper on aluminum in wrought iron and steel, an abstract of which we give in this issue, some remarkable results are recorded of the properties of iron alloyed with aluminum. On the other side of the ocean great improvements in the manufacture of various bronzes are reported. A number of new bronzes with various fancy names are coming into the market, such as Delta metal, deoxidized bronze, etc. Since aluminum has been reduced in price by the means of the new electric processes, a whole field of investigation is opening as to what uses can be made of the metal, and as to what properties it has when alloyed with other metals. The time seems to be ripe for a most extended and scientific investigation upon a large scale of the properties of the whole series of commercial metals and their alloys. We are just finding out how dense has been our ignorance up to recent times concerning them. As an instance, ever since pig iron was made, a few hundred years ago, up to almost the present time, it has been considered that certain brands or grades possessed peculiar valuable properties, and that certain other branches or grades were inferior. Chemical analysis, after years of unsystematic and tentative experiment, gradually revealed that the variations in properties had something to do with chemical constitution; but it is only recently that it has been experimentally shown, what might long ago have been foreseen, that a mixture of two different kinds of inferior iron, such as silver gray and white iron or remelted scrap, in certain proportions, definitely determined by analysis, could produce a superior grade of iron, approximating to the best charcoal. Millions of dollars might have been saved if this fact had been known to founders during the past half century.

Experimental research on the metals has been carried on in the tentative method, here a little and there a little. An isolated fact has been discovered now and then, and perhaps published, but its bearing upon other facts has been lost sight of till some other discovery made years afterward in another part of the world might throw light upon it and lead still further. HEATH put manganese in steel in 1845. BESSEMER decarburized iron by air in 1856, but left out manganese, and his metal was red short. MUSHET discovered that what HEATH did would improve BESSEMER'S metal. SIEMENS later invented the regenerative furnace, which was all that HEATH lacked to make open-hearth steel, but he also left out manganese, and it was left till some time later for MARTIN, in France, to add together what HEATH, and MUSKET and SIEMENS had done, and make open-hearth steel, and yet other years passed by before it was known that boiler plate must be low in both phosphorus and carbon to be of first quality. The introduction of steel boiler plate was delayed for years on account of the ignorance of the fact.

In fuel economy the same state of affairs exists. The experiments made by Johnson in 1843 still remain as the only comprehensive ones on American coals, and he tested only one coal mine west of Pittsburg. Our knowledge of the evaporative power of all the Western and Southern coals is but fragmentary and inexact. What can be done to improve the methods of burning these coals, such as the use of better forms of furnaces, automatic stokers, gas producers, etc., it is left for the future to determine. Much has been done in recent years to decrease the steam consumption in steam engines, but the conditions on which maximum economy depends, such as rate of speed, proportions of cylinders, range of expansion, clearance, valve motions, steam jacketing, and superheating, are still largely matters of doubt. Accurate tests of steam engines to determine their economy are but rare, and the lessons learned from such tests are of value chiefly in showing us the depth of our ignorance still concerning the whole subject of steam economy.

The same may be said of electrical engineering, and especially with that branch of it which includes electric traction and transmission of power. The comparative merits of steam, cable, and electric traction are to-day a matter of opinion rather than of exact knowledge.

What is needed in all branches of engineering, in order to make our knowledge more exact concerning new metals, materials, machines, and processes, is a laboratory of technical research of such magnitude that in it experiments on a large scale can be carried on, and, if necessary, for long periods of time. No private enterprise can equip such a laboratory,

and it would not be a paying institution in any event. Our government does not seem disposed to do anything in this direction since its failure ten years ago to appropriate money to carry on the investigations of the Iron and Steel Board.

The only hope, apparently, of the establishment of such a laboratory is that some public-spirited citizen will use his wealth to endow it instead of founding a new college or library. It is reported that one citizen of New York is about to give $20,000,000 for the founding of a Baptist university in this city. Possibly some one else may conclude to immortalize himse by founding the laboratory we suggest.

No reflection is intended in these remarks on the work that is now being done in the laboratories of our technical schools and colleges. The small band of professors who are devoting their time, talents, and in some cases their means, little as the latter may be, to the work of research, are worthy of all praise, and their contributions to knowledge are of great value. But we need a much larger and better equipped laboratory than any college has yet attempted. There is no objection to adding the proposed laboratory to one of the existing colleges.

We might continue at great length stating what such a laboratory should consist of, what apparatus it should contain, and what fields of ignorance should be attacked by it, but these may be left for future discussion.

THE CHICAGO ALUMINUM HUMBUG.

Less than a year ago it became our duty to expose an aluminum fraud in New York City; since that time we have shown up "schmiedbarenguss," the Louisville, Ky., aluminum humbug; and now one of the same genus turns up in Chicago. The following extract has been going the rounds of the press for a few weeks:

Prof. Hirsch, a chemist of Chicago, claims to have discovered a process by which aluminum can be extracted from common clay at a cost of 15 cents a pound. He is not yet ready to make known his process, but claims that with his experimental process he has already made from 30 to 50 pounds in a single day, and the process will permit of carrying on the manufacture on a mammoth scale. A company has been formed and two large buildings leased in Chicago for manufacturing purposes. A fine bed of clay in the suburbs of the city is also the property of the company, which proposes to begin producing the metal at the rate of 300 pounds per day.

The absurdity of this claim is self-apparent to any one familiar with the chemistry and metallurgy of aluminum, and the difficulty of separating its oxide from silica, with which it is combined in clay; but with such humbugs as this is, the more improbable the statements made concerning it, the easier apparently it is to get capitalists to invest in it.

In order that our readers may have both sides of this question and judge for themselves the probability of producing aluminum from common clay at 15 cents a pound, we first give Prof. HIRSCH'S own side in the shape of a letter he wrote to the *Industrial World* of Chicago:

DEAR SIR: Complying with your request for a brief statement regarding aluminum, I beg leave to say that I can certainly make it for 15 cents a pound, having proved that fact by actual test, and most likely for one-third that amount, in spite of the opinion expressed by a New York chemist that 45 to 50 cents was the lowest price he considered possible to make the metal for. He guesses upon a basis of ignorance and I state from actual experience. But while I can produce the metal at that price, I do not propose at this stage to sell it for that figure, and the Columbian Exposition here will probably be built of steel, not aluminum. I have orders enough on hand for the metal at a high price to keep me busy for several years, even with a capacity many times my present one, and although I shall produce in the immediate future considerable quantities, it will not affect the present market value of the metal for a long time, as my orders for manufactured goods will realize for me the present price of the metal, and still produce the manufactured articles as cheaply as if made of any of the commoner metals.

I receive numerous communications offering clay or kaolin of probable richness in the metal. I will say that I have tested many varieties from all sections of the country, and find our home product, Chicago clay, good enough for all purposes. I get that without paying any freight, and for less money than the freight from distant points would amount to. I purify it sufficiently for the production of the metal. A pure clay or alumina furnishes one-half its weight of metal; we have material enough right here to build an entire city of it, and have enough left over for all posterity.

I have also received numerous offers of financial aid, which I am compelled to thankfully decline, because I have enough for my present ability to manufacture, and if I had millions at my immediate command, as I have been offered, the element of time has to be considered, which it will require to erect works and start them.

Were the iron business to-day in the phase of the aluminum trade, although the former metal is known to be produced for nearly one cent a pound the time required for the establishment of iron mills with all the varied machinery as it exists now would require years and millions. Aluminum finds numerous uses where iron or other metals are unfit to be employed, so that the demands for it are really greater than for iron, and a reduction of its market value even if produced cheaply must be left to the future. The present great value of aluminum lays not in its ability to compete in price with cheap iron or tin, but in its qualities, rendering it useful and indispensable in cases where the baser and more imperfect metals cannot be employed to advantage. I shall turn out all classes of products that can be made from the metal, but shall not throw any of the crude material on the market for the reason that my present orders for these products, from a bell to a railroad car, will require all the metal I can produce. I am, sir, very respectfully yours,

E. J. M. HIRSCH.

A little private detective work has been done on Mr. Hirsch and his process, and the letters of two of the detectives have been placed in our hands. They make highly interesting reading, and we quote from them as follows:

CHICAGO, Aug. 17th, 1890.

GENTLEMEN: The inclosed clipping was handed to me by C—, and as I had already seen other notices by "Prof." Hirsch, I determined to come to Chicago and investigate the matter.

T— said he would go with me, so we arrived here together Saturday morning.

I first called at Hirsch's office in the Reaper Block, and was lucky enough to find the gentleman in. He looks about as the article describes him, wears glasses, and is a typical German. There were several other gentlemen in his office, one or two of whom were interested in the "Company," others apparently desirous of becoming interested, and all talking about aluminum when I entered. Without stating who I was, I referred to the notices in the papers, said I was interested, and should like to investigate the merits of his process. At first he was quite loquacious, telling me a great deal about aluminum, instructing me on many points about its uses, properties, etc., which I was ignorant of before, stating among other things that he had orders for several freight cars, passenger cars, etc., in fact, he was so flooded with orders for manufactured articles that it was the company's intention at first not to sell any pig metal at all, but only the articles of their own make. I asked him if the statement that he could make aluminum at 15 cents was correct, and he assured me it was. On the subject of his "process," however, he said he could say nothing, and that "the men who had put their money in thus far did not know the first thing about it, and no one did or would except himself." He did say this, however: that he did not use sodium, and that "his process was to a certain extent electrical," and that he "could purify the poorest clay." Thereupon I was at once satisfied that if he had any process at all it was either an infringement of the Hall process or of the Cowles. This impression was strengthened subsequently by other parties, who told me they had seen drawings which Hirsch had in his possession of some immensely large dynamos that were going into his Twelfth street works. Further conversation developed the fact to the "Professor's" mind that I knew a thing or two about the metallurgy of aluminum, so during the remainder of the interview he said little and appeared—so it seemed to me—a trifle uneasy, though I did not think so much about that at the time as I did afterward. T— was waiting for me outside, the scheme being for him to go in after I did and get further information. I talked over with him the result of my interview, and he concurred with me that if the man had any process at all it was either the Hall or the Cowles, and that it was very strange that he wanted "to buy as much pure aluminum as he could purchase" (which was another statement he made), to put into manufacturing articles, when he could make it himself for 15 cents per pound.

It very naturally struck us that there was more profit in making the pig metal at 15 cents and selling the pig than paying $2 a pound for it to others. The two six-story buildings at Twelfth street, "chock full of machinery to make all kinds of aluminum wares," in the light of the evidence, thus far appeared, to say the least, a trifle inconsistent. They had better, it seemed to us, put all their money in a smelting plant to turn out 15-cent pig aluminum, instead of part of their capital, if their orders were as great as was claimed. But this was made perfectly clear to us later.

We continued investigations to find out who this man Hirsch was, what his standing and reputation was in the community, as well as his ability as a chemist. In this we were also fortunate, as we found and talked with several Chicago gentlemen who were the very men who could best enlighten us, owing to certain circumstances in the past that had thrown them into such peculiar association with Hirsch in his other schemes as would enable them to know the man thoroughly. Two of these gentleman are prominent chemists here.

The reports which each of these gentlemen made to us tallied exactly, and were anything but favorable to Hirsch, his character or abilities. Briefly, his reputation, as one of them puts it, "is most unsavory" among those who have had occasion to know him. He has launched several schemes on the public before this, out of which he has always managed to make considerable money, and which generally end up in a law suit and to his advantage. His method is this: To talk around about the big thing he has discovered or is going to do; and, after he has excited a sufficient amount of interest to suit his purposes, to tell the ignorant capitalists that he does not want their money, that he has money enough, etc., till they fairly get on their knees "to let them in." After a little begging he apparently quite reluctantly lets them come in, but is shrewd enough to draw up a written contract with them, which allows him a long time in which to perfect his process or invention, and guarantees certain sums to be paid in at intervals for expenditures, and which are to be continued up to the time specified in case the matter has not been developed before. One of his schemes was making a new kind of illuminating gas; another, a special form of dynamo and electric light that was to supersede everything else in that line. After a while the capitalists begin to kick because they are not allowed to see anything, and nothing seems to materialize. Finally, they refuse to advance any more money, and then he sues them for failing to live up to their contract, and in the cases mentioned got judgment in both instances.

Hirsch is a remarkably shrewd man, possesses a certain amount of knowledge of chemistry and electricity, and among a certain class he is considered a great man. He always manages to so cover up his tracks as to escape detection among those he has thus far played with, and his wonderful brass and wonderful conversational powers do the rest. He has also been mixed up more or less with the anarchists here.

He told me that he had several hundred thousand guaranteed—that they had all the money they needed and had offers of a million from England, another million from Canada and another million from the State of Alabama.

The buildings on Twelfth Street are actually being fitted with machinery, and the present scheme bids fair to become the most gigantic fraud he has yet perpetrated.

Yours truly, C.

GENTLEMEN: Replying to your letter of August 9th, I have just seen Prof. J. M. Hirsch at Room 27, No. 97 Clark street, who tells me he has made a few hundred pounds of aluminum, at a cost of 15 cents a pound, and that he is now fixing up to make it in quantity, say 100 pounds or so per diem. The metal he claims to be pure 99.9 per cent., and gave me a sample, which I inclose. The metal will not be for sale, except as in manufactured goods. He showed me a small metal medal, issued by the Garland Stove Company, made of aluminum. I questioned the professor how he obtained the aluminum, and the source of supply, and he said it was obtained from common yellow clay to be obtained right here in Chicago, and that his process was partly electrical and partly chemical. But he declined decidedly to let me see his works, saying that the best way, he thought, for him to keep his business was to keep it strictly private. The professor also said they would make sheet metal, tubing wire, etc., and even implied that they might make these advertising medals, of which he showed me one. He said they would not, or did not expect to, sell the metal unmanufactured.

Mr. Besly, of Chas. H. Besly & Co., who deal in sheet aluminum, made by the Scovill Manufacturing Company, said Professor Hirsch had been in to see him about selling aluminum, and said he would soon be prepared to make two or three hundred pounds a day; but Besly took no stock in the professor's statements. Could Hirsch, or some one acting for him have bought some sheet aluminum from Besly, so as to show what he could make, and a portion of which he gave me?

I have been out to see "Hirsch's place" on West Twelfth Street, Chicago, and found as follows: At crossing of Twelfth Street and Wisconsin Central Railroad are two large five-story brick buildings used for furniture factories, provided with steam boilers, etc., but now closed up, and plentifully labeled "for rent" by Stone & Co. I was told by a talkative railroad crossing flagman they were to be used for the new wonderful process of making "alumner," the invention of a smart man, "Shultz," which was to revolutionize the whole business, could be made as soft as lead or as hard as steel, and take the place at 15 cents per pound of iron and steel, of copper, silver, lead, etc., etc., but upon further questioning I found he had not seen "Shultz," but only seen a man who had come in all the way from "Nevady" to take a hand in the business.

The buildings belonged, he said, to banker Silverman on La Salle street, Stone & Co. being only a rental agency. I was told there were some men working around the buildings, and I could find from them where this wonderful "Shultz" could be found; but upon crossing the open ground (about a square) to the buildings, and looking all around carefully, trying doors and windows, etc., I could find no one about, and no evidence of anything going on. The doors did not look as though they had been opened for weeks, though my friend of the railroad crossing said they had been hauling in some common-looking clay from "somewhere off to the southwest, looks like common brick clay."

I will take a trip out that way again before long and see what further progress is being made. Yours, etc., W.

The small sample obtained by the second of these detectives was analyzed by the Pittsburg Testing Laboratory, who found instead of 99.9 per cent. aluminum, that its analysis was as follows:

Iron	trace
Copper and phosphorus	trace
Silicon	1·45
Aluminum, by difference	98·55

The testing laboratory reports that the analysis of the metal is identical with that manufactured by the Pittsburg Reduction Company and rolled by the Scovill Manufacturing Company. There is therefore little doubt that HIRSCH purchased it of the latter through their Chicago agency.

We have now given both sides of the story with strict impartiality. Our readers may judge between them, but our private opinion is that Professor HIRSCH has laid himself open to the gravest suspicion, and that if he is not a fraud he had better lose no time in proving himself an honest man.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and that of the book buyers, give the retail price? These notices do not supersede review in Journal.]

Der Tunnelbau. Ein Lehrbuch von Carl Dolezalek. I Band. I Lieferung. Hannover, Helwingsche Verlagsbuchhandlung. August, 1889.

Electro-Chemical Analysis. By Prof. Edgar F. Smith. Published by P. Blakiston, Son & Co., Philadelphia, Pa., 1890. Pages 113. Price, $1. Illustrated.

First Annual Report of the Geological Survey of Texas. By E. T. Dumble, F. G. S. A., State Geologist. Published by the State. Austin, Texas, 1890. Pages 410. Illustrated. With maps.

THE ORE DEPOSITS AND MINES OF MINAS GERAES, BRAZIL.

(Prepared for the Engineering and Mining Journal by R. W. Raymond from the unpublished notes of A. Mezger, M. E.)

The history of gold mining in Brazil is very similar to that of California, the first workings having been placers, the origin of which goes back to about 1590. Underground mining in a regular way belongs exclusively to our own period.

The gravel of the rivers may have been washed formerly in the same manner, as may still be observed in operation to-day. The water of the rivers is turned aside into small channels, forming sluices with some inches of fall, and in these are spread raw hides, upon which the first rough washing takes place. The concentrated stuff is then washed clean upon the *batea*, a shallow wooden pan about 20 inches in diameter. The gold produced is usually pretty course, each particle weighing more than 0·5 milligram. The original deposits from which the placer gold has come are seldom known with certainty.

Another variety of gold-mining exists in this region, before describing which we must give some account of a very curious substance, laterite, the product of a physical and chemical change of the rocks, undoubtedly due to atmospheric agencies under the conditions of a tropical climate. It was first recognized in Ceylon, afterwards by Richthofen in China, by Perhuel, Loesche and Stanley in Congo-land, and finally by myself in Brazil, where Eschwege* and others had always called it clay. The points of difference between clay and laterite are, however, easily recognized. The presence in clay of snail-shells, small pieces of wood, etc., indicates that its materials have been brought together from other places; while laterite is seen to be substantially the same rock as that upon which it rests, but to have undergone a decomposition *in situ*, which has imparted to it a peculiar and interesting character. It appears to the traveler first at Rio de Janeiro, where the country rock, a very coarse-grained gneiss, is covered with a layer of laterite from 1 to 5 meters in thickness, and of a very bright red color as in Ceylon.

Veins of quartz and other minerals pass from the gneiss into the laterite without change of direction or thickness. Laterite exhibits upon fracture single grains of the original rock; and quartz, feldspar and mica can be unmistakably distinguished in it. But the whole mass is intensely red, and so soft that it can be without difficulty reduced between the fingers to a powder. A piece of laterite laid in water and left undisturbed retains its form, perhaps even after re-drying. But if shaken, even slightly, it becomes so liquid that a washing leaves nothing of it but a few very fine grains of magnetic iron.

Laterite results from the decay, not only of gneiss and granite, but also of all rocks which I encountered in Brazil, including slate, itacolumite and diabase. The color of the first mentioned varieties is, as already remarked, red; that of slate-laterite, yellowish white; and that of diabase-laterite, egg-yellow. The thickness of the laterite varies greatly, amounting in some instances to several hundred feet. The difficulty in maintaining railways and roads upon this treacherous material is the cause of heavy expenses in these particulars.

At many localities the slate-laterite contains gold throughout its mass. Diabase-laterite seems never to contain any, even where the underlying undecomposed diabase is auriferous (I have found diabase with as much as about $1.70 value per ton).

The slate-laterite carries generally about ½ gram of gold (about 27 cents worth) per ton. Notwithstanding this very small yield, it has been worked extensively at many places in former times. The method employed has been forgotten; and I was compelled to infer it from the very scanty traces of the workings. We may call it, perhaps, a kind of hydraulic mining, or, rather, slucing on a small scale and without the application of the enormous quantities and pressures of water which characterize modern hydraulic mining.

There is always a ditch, with a head of at least 8 feet; below it is a system of 20 or more parallel sluices, each about 30 to 35 feet long, 2 feet wide, and 1 foot deep. The sluices are nearly level. At the lower end is a terrace about 6 to 8 feet high, and once in a while there may be observed traces of tanks or reservoirs.

It will be easily understood that a material like laterite, which becomes fluid if simply laid in water, might permit the profitable extraction of even so small a proportion of gold as has been mentioned above - about 27 cents per ton. Where it could be handled by modern hydraulic methods, such material would yield a handsome profit. We find in the slate-laterite regions many old workings where thousands of tons have been treated and where it is evident that large numbers of laborers have been employed—almost without exception African slaves imported by the Portuguese.

The undecomposed slate contains many important intercalated bed-veins. Fissure-veins seem to exist exclusively in the region of the itacolumite and itabirite. Near the outcrops of these veins the rock is also much decomposed and very soft, so that the method described above can be, and has been, applied to it; but work was everywhere prosecuted only as far as the softness of the rock permitted. A very moderate degree of hardness and of resistance to the light stamps used in crushing, soon led to the abandonment of mining. It is in many places possible to see old workings on outcrops in a continuous line of from one to six miles, crossing the spurs of the main mountain range in a direction parallel to the axis of the latter, which is the direction of the strike of the slate and its enclosed deposits.

The depth of the workings, which are always on hill tops high above the valleys, is often from 60 to 200 feet. Rough assays of the quartz generally yielded me from about three grams ($1.70) to 10 grams ($5.70) per ton. Not having the opportunity at that time to make trustworthy assays, I was compelled to be satisfied with pounding the quartz in an iron mortar and washing it in the batea. No account was taken of the contents of the always auriferous sulphurets; and I estimate the loss in these tests at perhaps 50 per cent.

The method of working above described may have been in use as late as 1830, perhaps 1840, if we may judge from the incidental allusions (not perfectly clear) of Eschwege. It has been, however, entirely forgotten during the last 50 or 60 years, so that it is now impossible to get any description of it from the people.

The stamp mills seem to have been very modest affairs, the weight of each stamp being some 50 or 60 pounds, and mills of 12 such stamps being considered establishments of importance. The ditches for water supply were more respectable in magnitude. They can often be followed along the slopes of the high mountains from five to eight miles, or even more.

Very many mining excavations have been begun, and in all of them auriferous quartz is still to be seen, but an extensive mine is nowhere to be found. The necessary condition for that would have been the establishment of effective machinery, for which the Brazilians had neither the energy nor the money.

The only exception, as far as I know, is the property of the Dom Pedro Company, near the town of Marianna. The stratification in this place is very curious. One bed of itabirite, having a constant thickness of 14 to 15 feet, forms for one and a half to two miles the side of a hill, 800 to 1,000 high on the slope, which has, however, an inclination of only 15 to 18 degrees. Directly under this itabirite lies gold quartz, 14 to 20 feet thick, and likewise extending over the whole hillside. Here I was able to gather some data, proving that there have been made in this hill some 800 separate openings, mostly adits, and rarely shafts.

The length of these cross-adits from the surface, into and across the vein, to the foot wall, was always known in advance to be about 50 feet. On reaching the foot wall the miners broke or blasted down the quartz wherever it was in sight. A thin layer of itabirite, which came down easily, was also broken and used for gobbing the empty spaces, but in a most careless way. The size of the chamber increased, in spite of this rough partial filling, until want of air compelled the stoppage of the work. Their surveying seems to have been so poor that they could not locate air shafts (which would have needed to be only 18 or 20 feet deep), and they were apparently afraid to open communications with adjoining chambers, perhaps because this would be likely to occasion the breaking down of the roof.

The yield of this vein must have been very considerable, to judge from specimens which can still be found on the surface without trouble. I estimate it at upwards of $50 per ton. The pillars separating the chambers contain rich ore.

(TO BE CONTINUED).

* Eschwege was a German mining engineer who occupied, from 1828 to 1833, the position of Chief of the Department of Mines in Brazil. Several reports of his were printed in German.

NOVEL PLAN OF RAISING WATER FROM A SHAFT.*

By W. Galloway.

The shaft sunk by the Cardiff Steam Coal Collieries Company (Limited), at Llanbradach, was put down for the purpose of ascertaining the exact depth to the coal, and to gain such information as to pumping requirements, etc., as would enable the engineers to determine with some degree of certainty the fittings of the future colliery. It is also intended to form the upcast when the winding shaft has been sunk. It was known that a considerable thickness of the Pennant sandstone series, which is invariably found heavily watered, required to be passed through, and surrounding collieries have heavy pumping fittings. The absence of any means of determining the probable quantity of water to be dealt with in sinking led to special provision for winding the water to the surface. The contract provided for certain allowances whenever the water exceeded 4,000 gallons per hour, whether pumps were provided or not. The largest quantity met with was 7,500 gallons an hour in the shaft bottom. Down to a depth of 135 yards the total growth was 9,000 gallons an hour, of which 5,000 gallons was walled out by brick and cement walling. It would have been impossible to proceed with the sinking without pumps had it been necessary to fill the water into the kettle by the ordinary means of bailing. This bailing the author says he has long regarded as a disgrace to the art of mining, and so he devised what he calls the "Pneumatic Water Barrel." It consists of a cylindrical vessel of sheet iron, 4 feet 2 inches in diameter, and 8 feet deep, closed at the top by an air-tight man-hole door. The bottom is 5 inches above the lower edge of the cylinder, and has a circular hole in it 18 inches in diameter. This hole is closed by a faced valve of cast iron, mounted with a sheet of leather, capped and tightly clasped by an iron hoop. The valve is attached to a spindle by a ball and socket joint, by which it is kept in position, but allowed a certain amount of play so that it may readily accommodate itself to its seat. The cylinder is thus an air-tight vessel, the interior of which has communication with the exterior atmosphere only by means of a pipe, extending from close to the top of the cylinder in the inside, to the outside of the vessel half-way down. The outside end of the pipe is fitted with an instantaneous coupling identical with that used on the vacuum railway brake. In use the pneumatic water barrel is lowered into the shaft till its lower edge is under water in the shaft bottom. The interior is put into communication with a condenser air pump on the surface by attaching a flexible tube connected to the vacuum pipes in the shaft to the instantaneous coupling of the barrel. A vacuum equivalent to 20 to 22 inches of mercury is thus obtained inside the barrel, and the water rushes in through the bottom valve. A glass gauge tube on the outside of the vessel shows when it is full. The tube is detached, and the signal given to raise the barrel. When it reaches the surface a bogie is run under it, and it is lowered on a conical block of wood, which raises the valve, and the water escapes. With 7,500 gallons of water an hour thus raised, the rate of sinking was four yards a week. When the growth was only 500 gallons an hour, the progress attained was six and a half yards per week.

*Abstract proceedings South Wales Institute of Engineers, Vol. XVI.

CUBAN IRON AND MANGANESE ORES.

Consul-General Crowe, in a recent British Foreign Office report from Havana, says: "With the exception of copper, the existence of which was known to the aborigines and early Spanish settlers, no other metals were supposed to exist in appreciable quantities in Cuba. First, in 1880, iron in large quantities was known to exist in the mountains of the eastern provinces, and, in the following year, the first iron mines were reported and claimed, and the right of working 780 hectares obtained from the government; the consequence of which was the subsequent discovery of many fields and lodes of rich iron and manganese and other metals, including some gold and asphalt. Since then, I have (he says) on several occasions endeavored to call the attention of the British public to the opening Cuba offers for mining enterprise, but hitherto the field has been left to the Americans, who during the last decade have made some profitable ventures. The Juruaga iron mines have now for six years been successfully worked with American capital, and recently another large group of similar mines has been bought by a Philadelphian syndicate, which have formed a company to work them, with a capital of $5,000,000. The price paid is reported to be: $150,000 cash, with a royalty of 30 cents silver per ton on the first 60,000 tons of ore extracted; 25 cents silver per ton on the next 40,000 tons; and 20 cents silver per ton on all the tonnage extracted over and above 100,000 tons during the first year's working. Operations are to commence in October of the present year by the construction of a bridge and artificial harbor, and a railway thence to the mines. The Americans have the reputation of being shrewd and cautious in their foreign ventures, and the fact of their having invested so largely in Cuban mines has attracted the attention of the natives to the latent wealth of their island, and fresh mines are being eagerly sought for and claimed; thus, several apparently valuable mining properties are at present in the market, one or two of which appear to be of brilliant promise and easy access. The analysis of the surface ore from one of these mines gave 28 per cent. of iron and 29 per cent. of manganese (metallic). It is situated on the coast, and it is computed that the surface ore and that known by borings to exist in the lodes, will give 6,000 tons monthly for the next fifty years. The cost of breaking the ore and its shipment to the States is calculated at from $6 to $8 per ton, which, at current American prices, should leave a profit of $7 per ton. Ten distinct groups of iron mines have been discovered and claimed for working, eight of which are for sale, the owners being too poor to work them. Two only have been sold, as stated above, to Americans, one of which gives 67 per cent. of pure iron. Some are reported to contain neither phosphorus nor sulphur; another is stated to have 500,000 tons of rich iron on the surface, without counting what is below it; and all are reported by native and American experts to be more or less extensive and valuable—some exceedingly so. All mines are exempt during 20 years from export duty and surface tax, and are allowed free import of coals. These exemptions, the facility of obtaining labor, the low rates of freight to the States, and the steady demand for iron, ought to facilitate and render profitable the working of these promising properties."

CENSUS OF PIG-IRON PRODUCTION.

The following is an extract from Bulletin No. 9 of the Census Bureau. It was prepared by Dr. Wm. M. Sweet, special agent in charge of the statistics of the iron and steel industry:

The production of pig iron during the year ended June 30th, 1890, was the largest in the history of the iron industry of this country, amounting to 9,579,779 tons of 2,000 pounds, as compared with 3,781,021 tons produced during the census year 1880 and 2,052,821 tons during the census year 1870. From 1870 to 1880 the increase in production amounted to 1,728,200 tons, or nearly 85 per cent., while from 1880 to 1890 the increase was 5,798,758 tons, or over 153 per cent. The following table shows the production of pig iron in the various sections of the country in the census years 1870, 1880 and 1890, in tons of 2,000 pounds, including castings made direct from the furnace. The statistics for 1870 and 1880 are for the census years ended May 31st, but for 1890 they cover the year ended June 30th:

DISTRICTS.	Tons of 2,000 pounds.		
	Year ended May 31, 1870.	Year ended May 31, 1880.	Year ended June 30, 1890.
New England States	34,471	30,957	33,781
Middle States	1,311,649	2,401,093	5,216,591
Southern States	184,540	350,436	1,780,909
Western States	522,161	995,535	2,522,351
Far Western States	.....	3,200	26,147
Total	2,052,821	3,781,021	9,579,779

From the above it will be seen that the pig-iron industry of New England has been practically stationary during the past 20 years, while during the same period, and especially since 1880, there has been a wonderful development of the manufacture of pig iron in all other sections of the country.

In the census year 1880 the pig-iron industry was located in 24 States and 1 Territory, but pig iron was produced in only 22 States, the furnaces in Minnesota, North Carolina and Utah being idle in that year. In the census year 1890 there were 25 States which contained completed blast furnaces, and pig iron was made in that year in each of these States, except Minnesota. Since 1880 the manufacture of pig iron has been abandoned in Vermont and Utah, and during the same period two States, viz., Colorado and Washington, have engaged in its production. In the census year 1880 Minnesota contained one charcoal furnace, but it was not in operation in that year, and was abandoned in 1888. In the census year 1890 a large coke furnace was under construction in that State, but it was not completed until near the close of the year, and consequently had no product to report. California does not appeal among the pig iron producing States in either 1880 or 1890. A charcoar furnace was completed and put in operation in that State in 1881, but it has made no pig-iron since 1886, and is practically abandoned.

The relative rank of the various States is seen to have undergone many changes since 1880. Pennsylvania still retains its leadership as the producer of about one-half of the pig iron that is annually made in the United States, producing 51 per cent. of the total production in the census year 1880, and over 49 per cent. in 1890. Ohio was second in rank in both 1880 and 1890, the output of pig iron in the former year being over 14 per cent. of the total production in the United States, and in the latter year over 13 per cent. Alabama, which occupied tenth place in 1880, with an output of 62,336 tons, is now the third largest producer of pig iron, the production of this State in 1890 amounting to 890,432 tons, an increase of more than 1,328 per cent. over the production of 1880. Illinois, which was seventh in rank in 1880, is fourth in 1890; and New York, which was third in 1880, occupies fifth place in 1890. Virginia, which was seventeenth in rank in 1880, is now sixth, while Tennessee has gone from thirteenth to seventh place.

The following table gives the production of pig iron by States, in tons of 2,000 pounds, including castings made direct from the furnace, during the census years 1880 and 1890, with the number of completed furnace stacks at the close of each year, the relative rank of each State, and its percentage of the total production:

Rank.	STATES AND TERRITORIES.	Year ended May 31st, 1880. Completed furnace stacks.	Production of pig iron in tons.	Percentage of total production.	Rank.	STATES.	Year ended May 30th, 1890. Completed furnace stacks.	Production of pig iron in tons.	Percentage of total production.
1	Pennsylvania	269	1,936,311	51.05	1	Pennsylvania	224	4,712,511	49.19
2	Ohio	103	548,712	14.51	2	Ohio	71	1,302,299	13.59
3	New York	57	313,368	8.29	3	Alabama	48	890,432	9.29
4	New Jersey	20	157,414	4.16	4	Illinois	15	674,506	7.04
5	Michigan	27	119,586	3 16	5	New York	37	359,040	3.75
6	Wisconsin	14	118,282	3.13	6	Virginia	31	302,447	3.16
7	Illinois	10	95,468	2.52	7	Tennessee	19	290,747	3.04
8	Missouri	17	95,050	2 51	8	Michigan	26	224,908	2.35
9	West Virginia	11	80,050	2.12	9	Wisconsin	10	210,037	2.19
10	Alabama	15	62,336	1.65	10	New Jersey	18	145,040	1.51
11	Maryland	22	59,664	1.58	11	West Virginia	5	108,764	1.14
12	Kentucky	22	58,108	1.54	12	Missouri	8	99,131	1.04
13	Tennessee	21	47,873	1.27	13	Maryland	14	96,246	1.00
14	Georgia	10	23,099		14	Kentucky	6	44,199	.....
15	Connecticut	8	18,779		15	Georgia	5	35,747	
16	Indiana	4	18,237		16	Connecticut	8	21,700	
17	Virginia	31	17,906		17	Colorado	2	12,949	
18	Massachusetts	6	9,543	2.51	18	Indiana	2	11,470	
19	Oregon	1	3,200		19	Texas	4	8,950	1.71
20	Maine	1	2,015		20	Oregon	1	8,411	
21	Texas	1	1,400		21	Massachusetts	4	8,381	
22	Vermont	1	620		22	Washington	1	4,787	
23	Minnesota	1	.....	.....	23	Maine	1	3,700	
24	North Carolina	7	.....	.....	24	North Carolina	1	3,377	
25	Utah	2	.....	.....	25	Minnesota	1	.....	.....
	Total	681	*a*3,781,021	100.00		Total	562	*b*9,579,779	100.00

a Includes 4,229 tons of castings made direct from furnace.
b Includes 9,929 tons of castings made direct from furnace.

Notwithstanding the fact that the production of pig iron has increased from 3,781,021 tons of 2,000 pounds in 1880 to 9,579,779 tons in 1890, the total number of completed furnaces has decreased during the 10 years from 681 to 562. Many furnaces which were in the active list in 1880 have since been abandoned, owing to their inability to profitably compete with the larger, better located, and more modern furnaces of the present day. The majority of these abandoned furnaces were of small capacity, and were able to produce and market pig iron only during periods of great demand and consequent high prices, while the large number of new and improved furnaces which have been built during recent years, and which are favorably located for the supply of materials at low cost and within easy access to market, have now made the operation of these antiquated furnaces unremunerative even in periods of great activity.

One of the most noticeable features in the growth and manufacture of pig iron in this country during the past decade is the development of the blast-furnace industry of the Southern States. In 1880 the South had already commenced to appreciate the value of the extensive deposits of iron ore and coal within her borders, and to realize the superior advantages which she possessed for the cheap production of pig iron, owing to the close proximity to each other of these materials, and a number of large coke furnaces were built in that year and the few succeeding years. The greatest activity, however, in undertaking new furnace plants was in 1887, during which year five new furnaces were blown in and 25 others were under construction. There has been but little abatement in this activity to the present time.

The following table shows the production of pig iron in the United States, in tons of 2,000 pounds, in the census years of 1880 and 1890, arranged according to the fuel used, with the percentage of increase or decrease in production in 1890:

FUEL USED.	Year ended May 31st, 1880.	Year ended June 30th, 1890.	Percentage of increase in 1890.	Percentage of decrease in 1890.
	Tons.	Tons.		
Anthracite alone	1,112,735	323,258	.....	70·95
Mixed anthracite coal and coke	713,932	1,879,098	163·20	.....
Coke and bituminous coal	1,515,107	6,711,974	343·00	.....
Charcoal	435 018	655,520	50·69	.....
Castings direct from furnace	4,229	9,929	134·78	.....
Total	3,781,021	9,579,779	153·36	.....

ACCIDENT TO THE SAULT STE. MARIE CANAL LOCK.

The recent accident to the lock of the great ship canal at Sault Ste. Marie is described as follows by the *Marine Review*, to which paper also we are indebted for the illustrations:

Through this canal there has passed during the last nine years $519,254,065 worth of freight, carried by 58,323 vessels, for which the lock was opened and closed 29,267 times. During 234 days of 1889, 9,579 boats, with tonnage of 7,221,935 tons, passed through this canal, while only 3,425 boats, with tonnage of 6,783,187, passed through the Suez canal. Were all this traffic thrown onto the lines of railway they would be hopelessly blockaded, and the retarded circulation of commerce resulting would more seriously affect the financial condition of the country than any one other feature of transportation.

Figs. 1 and 2 represent the north emptying valve beneath the lower gate, in a tunnel that extends from the well *Y* (see Fig. 3) to the well *Z*, whence it discharges into the canal, as represented in Fig. 4. This valve, as is shown in Fig. 1, is in the tunnel midway between the wells and almost directly under the miter sill. It is 10 feet wide by 8 feet deep (Fig. 2) and moves on a trunnion, which has bearings in a heavy iron frame bolted to the culvert or tunnel. The valve consists of a cast iron frame covered with boiler iron. Lugs from the valve attach to a pitman connected with a piston rod, which is operated by water cylinders indicated by *L* in Fig. 5. Water from an accumulator, with a cylinder 21×124 inches, and capacity of 1,859 gallons, may be admitted to either end of the 15-inch water engine cylinders. This power is obtained from two 30-inch turbines, geared to a main shaft, and fed through a supply pipe *B C*, Fig. 5, from the canal above the lock. A belt from the shaft runs two force pumps, each having three plungers, which pump into an accumulator loaded so as to give a pressure of about 120 pounds to the square inch. Water is taken from the accumulator to the engines, operating gates and valves.

As is shown in Fig. 2, the trunnion to this valve broke, and the valve, falling back under a pressure of 45 tons to position, twisted the connecting rod of the water cylinder. The cap square was also broken, the breakage being attributed by some to the jar caused by blasting with dynamite for the new lock. The gateway of the Northwest was closed, the Colossus of Locks had closed up business for a summer vacation, while 265 vessels, valued at $16,489,000 with $2,525,550 worth of cargo and 1,362 passengers, lay motionless.

The diver secured the broken piece of trunnion, 6-inch hollow cast steel, over which a wrought iron wrist had been shrunk last winter. A piece of 4-inch steel was threaded, and an old cap square repaired, so that when the lock was pumped out the repairs were quickly made by putting the bar of steel through the hollow trunnion and bringing the broken parts together. The repaired cap square was put on, the twisted connecting rod was straightened and the filling of the lock was all that was necessary for the delayed fleet to resume movements, 81 vessels being locked through the second day that the canal resumed operations, 87 on the third day and 85 on the fourth. The shock that probably caused the accident seemed to shake up Northwestern railway presidents and boards of trade until the influence was felt at Washington, so that amendments will likely be made to the river and harbor bill that will give $900,000 to the new lock and approaches for the coming year, and provide that contracts be entered into for the entire structure.

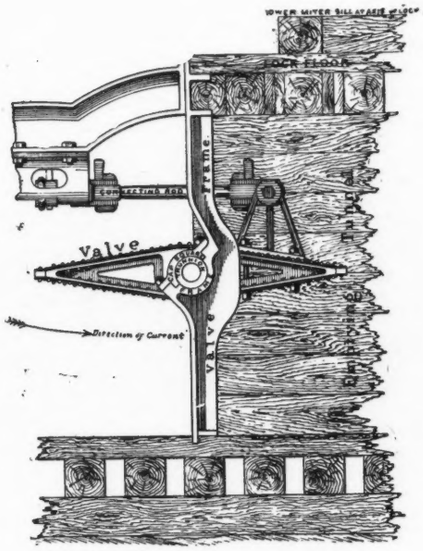


FIG. 1.—THE NORTH EMPTYING VALVE.

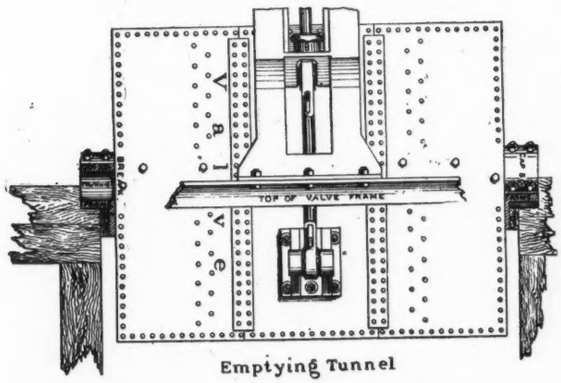


FIG. 2.—THE NORTH EMPTYING VALVE.

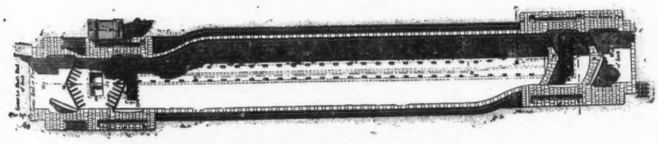


FIG. 3.—FLOOR PLAN OF LOCK.

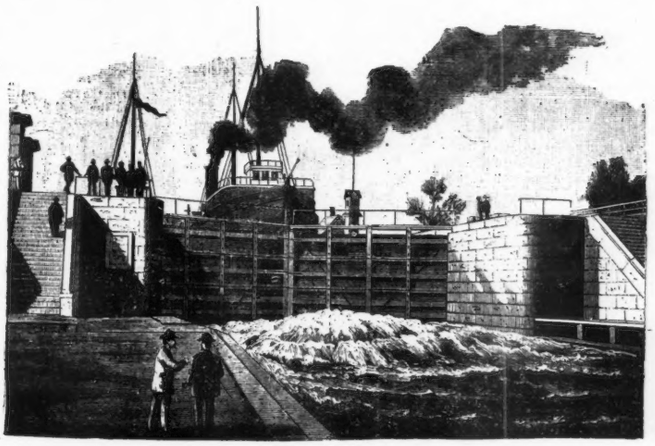


FIG. 4.—VESSEL IN LOCK.

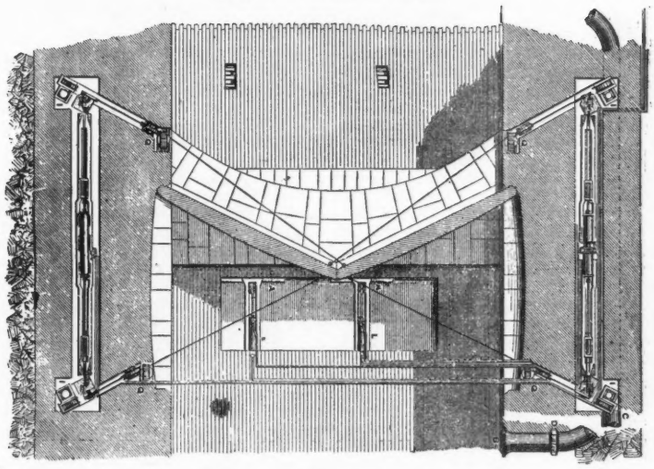


FIG. 5.—PLAN OF GATES AND MACHINERY.

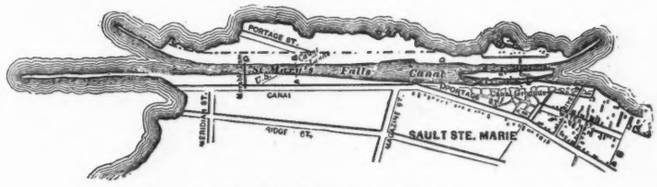


FIG. 6.—MAP OF LOCKS AND RAPIDS.

The lock in use at present was commenced in 1873, after plans advised by Gen. Poe, and was completed in 1881. The chamber of the new lock is 515 feet long, 80 feet wide, except at the gates, where it is 60 feet, and the depth is 39½ feet. The lift of the lock is 18 feet and the depth on the outer sills is from 16 to 17 feet. A guard gate at either end makes the extended walls 717 feet long. They are 13 and 25 feet wide at varying distances. About 35,000 barrels of cement and 34,207 cubic yards of masonry were used in the walls. In the miter walls for the upper lock and guard gates there are nine courses of cut stone, each two feet thick. The walls are 14 feet wide at the miter angle, are arched to resist the pressure on the gates, as shown in the right in Fig. 4, and are bonded into the lock

walls. The top course of stone is set back one foot, so as to leave an offset, on which the oak miter sills rest; these sills project two inches above the masonry.

The foundation is on rock throughout. In excavating the lock pit rock was reached at from 1 to 15 feet above the grade of the lock floor. A floor of timber and concrete extends across the bottom of the lock, and five feet under each wall; the rest of the wall foundation is concrete, one-half to two feet thick on the rock. All the foundation timbers are of pine, one foot thick. The miter sills are of oak, 12 × 18 inches, and are held in place by bolts, 10 feet long, fox wedged and concreted in the rock, and also by timber braces bolted to the rock.

The four gates, two being guard gates used only in case of accident and for repairs, are shown by *P Q R S* in Fig. 3. The weight of one leaf of the upper gate is 40 tons, while a leaf of the lower gate weighs 76 tons, being made of white oak and Norway pine. The position of the four gate engines, which are operated by water taken from the accumulator, is shown by *J J J J* in Fig. 3. and their movement is indicated in Fig. 5. Each crosshead is constructed with two sheaves. One end of a wire rope is adjustably fastened at *I*, Fig. 5, and, passing around one of the engine sheaves, is led by suitably located sheaves down through the well in the lock wall, around the drum *Q*, and to a leaf to which it is secured. The four ropes necessary for the opening and closing of each gate are clearly shown in Fig. 5. When the engine makes a stroke, the end of the rope attached to the gate moves four times as far. With a pressure of 200 pounds per square inch, the total pull on the leaf of the gate is 8,835 pounds, less friction and rigidity of rope. In case the gates should be carried away, provision has been made by means of a movable dam 3,000 feet above the locks, for the closing of the guard gates,

Water is let into the locks from culverts under the floor extending from the well *X* (Fig. 3) above the upper lock gate to the well *Y* above the lower lock gate. The two culverts are separated by a longitudinal bulkhead, and each is 8 feet square. The floor of the lock forms the roof of the culverts. The water passes into the lock chamber through 58 apertures in the floor, shown in Fig. 3. The total area of these apertures is 174 square feet; this outlet area is increased to 190 square feet by manholes left in the bulkhead at the lower end of the culverts. The combined area of the cross sections of the two culverts is 128 square feet. Having the inlet area considerably less than that of the outlet tends to diminish the velocity of the water when projected upward into the lock chamber. The water in passing out of the lock goes down through the well *Y*, which, as well as the well *X*, is covered with a grating, thence through short culverts and up through the well *Z*. The valves in the culvert through which the water enters are the same as the discharge culvert valves, already described.

The first lock was constructed during 1853, 1854, and 1855 by the State of Michigan, to which Congress made a grant of 750,000 acres of land for the purpose. Previous to 1845 several brigs in the fur trade were the sum total of the fleet on Lake Superior, but the discovery of copper made the portage of Sault rapids an important one, and with the discovery of iron ore came demands for the canal, the first ship canal in the United States, and at that time the largest in the world. The Sault rapids, which have made the canal and lock necessary to lake navigation, are half a mile long and have a fall of about 17 feet, the fall from Lake Superior to the Sault being one-tenth of a foot, and thence to Lake Huron about two feet. For a few years vessels were transported on ways to the head of the rapids and then relaunched, and for a short time a horse tramway did an extensive business between the foot and head of the rapids The first canal cost $1,000,000, and was 5,400 feet long, 100 feet wide and 12 feet deep. The present canal, with a depth of 16 feet, was completed but a short time when the increase of commerce demanded greater facilities, and the work of making a channel 20 feet deep was undertaken. It consists of the construction of a new lock on the site of the old State locks, to be 800 feet long, 100 feet wide and 21 feet on the miter-sill. This will enable ship builders to design boats on lines which are known to give the greatest carrying capacity, while at present they are hampered by making ships comply with the narrow depth. The estimated cost of the new lock and improvement is $4,738,865. One million has been appropriated, and up to June 30, 1889, $250,331 had been expended, and the remainder of the appropriation was covered by contracts. The lock in use at present cost $2,404,124.

DEPOSITED COPPER PIPES.

The Elmore Patent Copper Depositing Company (Limited), of London, is taking orders for deposited copper pipes of any sizes up to 3 feet 4 inches in diameter and 10 feet long. The material of these pipes has a tensile strength of over 25 tons to the square inch, and an elongation of over 14 per cent. in 4 inches. After the experience of recent failures in copper steam pipes it is a relief to find that there is a pipe now made free from welds and joints of every kind, that offers absolute security with the high pressures now employed. Each pipe has etched upon it the results of a test which is made of a strip cut from its end. The pipe consists of pure copper, free from admixture with other metals, and the only variation which can occur is in its hardness. It is possible to produce hard or soft metal at will, according to the purpose for which it is to be employed.

The method of making these tubes consists in depositing the copper, by means of an electric current, upon a mandrel which is rotated in the solution. An agate burnisher travels along the mandrel, rubbing the particles of copper as they are formed into those beneath them, thus forming a fibrous plate of perfectly uniform structure and great strength. The speeds of mandrel and burnisher are so adjusted that only a very fine film can form between two applications of the burnisher to the same spot. The mandrel is covered with black lead, and after it is taken out of the bath the copper is rolled; this causes it to expand, when it can easily be slipped off.

Copper electrotypes are deposited with a current of 6 ampères per square foot. Each ampère deposits ·00033075 grams per second. Working day and night for six days = 144 hours, there will be deposited on a square foot 1,026 grams, or 2¼ pounds of copper. This would give a plate $\frac{1}{20}$-inch thick.

The Elmore copper steam tubes are deposited at the rate of ¼ inch in thickness per week of 144 hours, or 6 pounds per square foot of surface.

It requires an electromotive force of from ·2 to ·3 volts to effect the chemical reduction of copper sulphate solution, and if we assume the combined efficiency of engine, dynamo, leads and bath to be only 25 per cent., then each indicated horse power will deposit 888 grams, or 1·95 pound of copper per hour. This shows a ton of coal used in a modern engine will deposit a ton of copper.—*Engineering.*

NOTES ON THE BESSEMER PROCESS AS CARRIED OUT IN ROBERT VESSELS.

At the Rue Oberkampf, in Paris, a little Robert vessel of the now well-known type, at the time of my visit, treated charges of about 2,600 pounds, but could at will treat charges as light as 1,100 and as heavy as 4,000 pounds. Blast at 2·5 to 3·5 pounds pressure to the square inch enters through five tuyeres, 1·18 inches in diameter. As many as fifteen heats are made in the single shift of from 10 to 12 hours. The lining, said to be 15·75 inches thick, is repaired at the end of every week, after making, say, forty heats, and is completely replaced after 1,000 heats.

I took the following notes on one heat, which was much like those before and after it:

0 min. 0 sec. blow begins, silicon 2·11 per cent.
4 min. 23 sec. vessel turned up farther.
5 min. 8 sec. vessel turned up still farther. Only sparks and smoke till now.
5 min. 23 sec. flame begins to be visible.
6 min. 23 sec. first sample taken, silicon 1·34 per cent.
10 min. 53 sec. sodium line flickers faintly.
14 min. 8 sec. second sample taken, silicon 0·25 per cent.
16 min. 38 sec. sodium line well marked.
20 min. 38 sec. blow ends: Third sample taken, silicon 0·02 per cent.

After 15 minutes more, during which the charge had been recarburized in the vessel, by pushing the slag back and introducing 1 per cent. of ferro-manganese containing 72·3 of manganese, and a sample of the resulting metal had been tested in the forge, they began pouring the metal into ladles. After 8 min. 30 sec. more, or 24 min. 30 sec. after the end of the blow, all the metal had been teemed into small sand moulds. A very considerable skull remained at the bottom and top of the last ladle.

The cast-iron treated was said to contain carbon, 3·75 per cent.; silicon, 2·40 per cent.; manganese, 1·00 per cent.; phosphorus, 0 05 per cent.; sulphur, 0·05 per cent., and was therefore rather a hot iron. The temperature of the recarburized metal seemed to me, however, rather below than above the normal temperature.

I made the following observations on another heat:

0 min. 0 sec. turn up, blow begins.
1 min. 20 sec. much red smoke, abundant sparks, no true flame.
4 min. 20 sec. the same; strong smell of iron-oxide.
6 min. 10 sec. vessel turned up farther; bright flame two feet long, less but still considerable smoke.
7 min. 5 sec. slight roar begins: flame dazzling.
10 min. sodium line begins to flicker; still much smoke.
13 min. flame four feet long; still much smoke.
15 min. sodium line still very unsteady; much smoke.
17 min. sodium line much more steady, but still wavering.
19 min. sodium line steady; vessel turned down; blow ended.

Recarburize as before. Begin pouring 15 minutes after the end of the blow. Castings all poured by 22 minutes after the end of the blow. A pretty heavy skull was formed at the high-water mark of most of the ladles, but only a little skull formed at the bottom of even the last ladle. The steel was said to contain about 0·30 per cent. of carbon.

The spectrum was surprisingly indistinct. In one case, even when the blow was half finished, the sodium line only flickered faintly, and it did not become steady till three-quarters of the blow was finished. In another case it was not steady till the very end of the blow. My recollection is that the carbon lines never became distinct. But I find no distinct record of this in my notes.

The faintness of the spectrum might, I thought, be due in part, if not wholly, to the red and gray smoke which escaped.

The blowing seemed to me extremely young; the vessel was turned down in most cases before any well-marked shortening of the flame had occurred.

M. Robert favored me with the following particulars of the practice at Stenay:

Acid Converter.—On a certain shift 13 heats were made, the charge weighing from 1,630 to 1,740 pounds. The blast pressure was about 6·3 pounds per square inch, the loss 11·7 per cent; 44 pounds of coke were used per 100 of cast-iron treated, including the bed for the cupola and that used for heating the vessels. The blow lasted from 8 to 14 minutes.

On the following shift the loss was 12·7 per cent., and 35·8 per cent. of coke was used per 100 of cast-iron. I again refer to the loss farther on.

Basic Converter.—On the night shift 10, on the day shift 16 heats were made. The loss was 17·6 and 11·3 per cent., the consumption of coke 46·7 per cent. and 23·8 per cent. on these two shifts respectively. The blast-pressure lay between 4 and 6·5 pounds. The blow lasted from 7½ to 11 minutes.

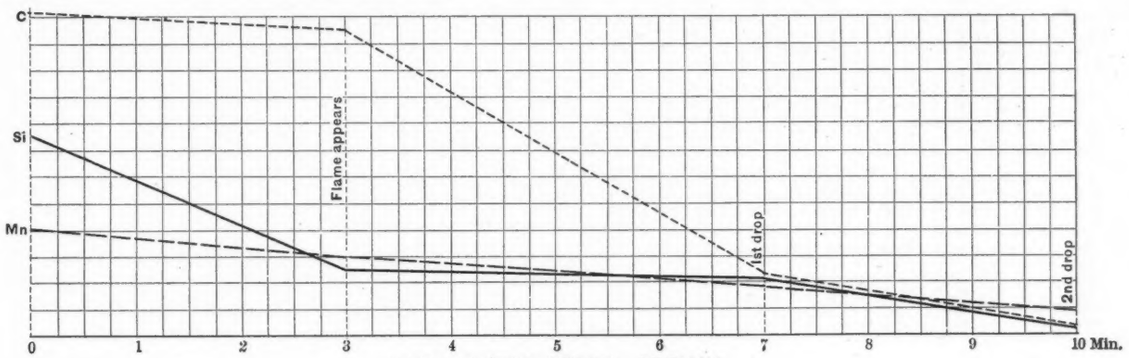
The progress of the removal of the non-ferrous elements in one acid and two basic blows are shown in the accompanying table and diagrams.

At Weissnichtwo, however, quite different accounts of the Robert modification were given me. Here the loss of iron in conversion is usually from 17 to 20 per cent, and it rises even to 25 per cent., when the charge is initially a little cold, for then an unusual excess of iron must be burnt in order to raise the temperature. This agrees exactly with the suspicions which I have from the first expressed, to wit: that the excessive temperature which is claimed for the Robert modification is due to exactly such excessive oxidation as we habitually obtain in the common vessel when, by blowing on the side, we intentionally reproduce the conditions of the Robert vessel, in order to raise the temperature when it has been unduly lowered.

The following compositions of steel made in the Robert vessel, all intended for the same purpose, indicate that the control over the composition of the steel is hardly as good as in the common vessel. These heats

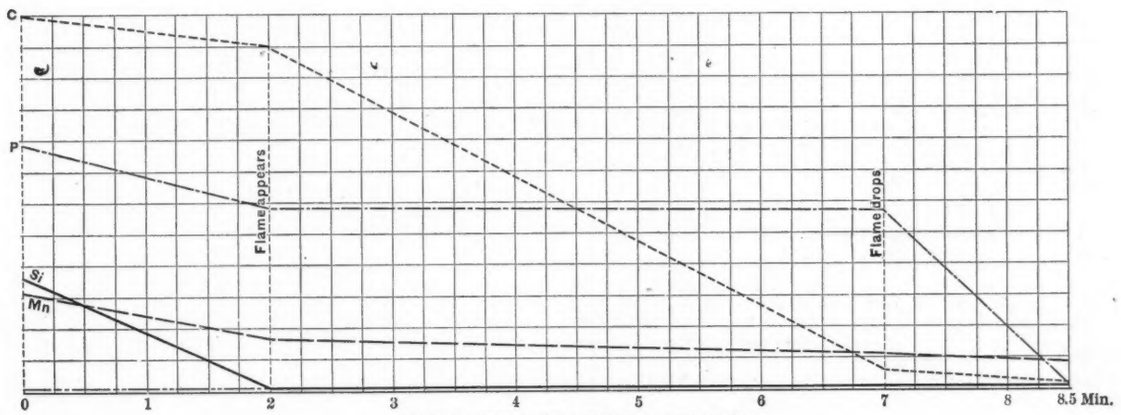
REMOVAL OF THE NON-FERROUS ELEMENTS IN THE ROBERT BESSEMER VESSEL.

	Basic, 2,204 lbs.					Basic, 1,790 lbs.						Acid, 1,850 lbs.					
	C.	Si.	Mn.	P.	S.	Time.	C.	Si.	Mn.	P.	S.	Time.	C	Si.	Mn.	P.	S.
Before charging in the cupola							3 70	0.94	1.30	2 10	0.045		3.95	2.60	1.40		
On charging in vessel	3.00	0.91	1.00	1.74	0.075	0′	3.05	0.905	0.80	1 93	0.04	0′	3 10	1.90	1.00		
Flame appears at the vessel-mouth						2′	2.75	0 046	0.40	1.45	0.035	3′	2.95	0.60	0.75		
First drop of flame						7′	0.15	0.040	0.295	1.43	0.035	7′	0.60	0.55	0.45		
Second drop of flame																	
End of blow		0.038	0.200	0.11	0.038	8′ 30″	0.07	0.035	0.20	tr	0.030	10′	0.08	0.035	0.20		
Contained in the recarburizer			0.64														
Sum			0.84														
In the recarburized steel		0.035	0.45	0.098	0.038												
Loss			0.39														



ACID ROBERT VESSEL, STENAY.

Fig. 1



BASIC ROBERT VESSEL, STENAY.

Fig. 2

are not strictly consecutive, as other heats designed for other purposes were scattered between them; but they give all the heats in the period covered in which this particular class of steel was aimed at.

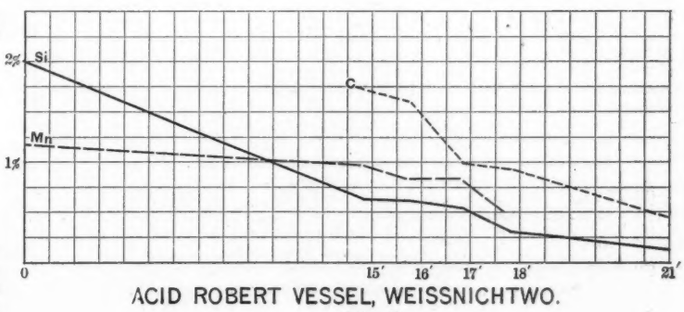
Carbon.	Silicon.	Carbon.	Silicon.
·34	·205	·29	·027
·35	·130	·333	·027
·36	·177	·33	·010
·40	·167	·36	·084
·36	·084	·38	·084
·39	·112	·38	·093
·36	·037	·338	·084
·35	·074	·328	·102
·375	·037	·362	·102
Total variation		·11	·178

In a former study of the uniformity of the Bessemer process,* the highest range of variation of carbon which I found in case of Bessemer vessels blowing cupola-remelted iron, was less than 0·09 per cent. The greatest range of variation for silicon which I found was 0·021 per cent.; but this was for soft steel, and is therefore hardly comparable with the present case. However, in another series of cases now under analysis, and to be presented later, I hope, I find the range of variation of silicon for steel of about the same proportion of carbon, as that above given is much below 0·78 per cent.

Turning back for a minute to the Rue Oberkampf practice, we note that the cast-iron treated contained 6·75 of non-ferrous elements, which would be almost wholly removed in blowing. The 2·40 per cent. of silicon would, in scorifying, take up the 1 per cent. of manganese and about 1·66 parts of iron in addition, somewhat as in the following calculation:

2·40 parts of silicon oxidize to $2·40 \times 2·143 = 5·143$ parts of silica. One part of manganese forms 1·291 parts of manganous oxide. Assume that the slag contains 60 per cent. of silica. It would probably have less, judging from the quantity of iron-oxide fume given off; but let us make the assumption purposely favorable to the Robert vessel.

* Trans. Am. Inst. Mining Eng., XV., p. 340, 1887.



ACID ROBERT VESSEL, WEISSNICHTWO.

Fig. 3

Under this assumption, our 5·143 parts of silica would combine with $5·153 \times \frac{40}{60} = 3·43$ parts of oxides of iron and manganese. As we have 1·29 parts of manganous oxide, $3·43 - 1·29 = 2·14$ parts of ferrous oxide or 1·66 parts of metallic iron are needed.

Here, then, we have some $6·75 + 1·66 = 8·41$ per cent. of loss, allowing nothing for loss in cupola slag, for scorification of iron to satisfy the silica eaten off from the lining and tuyeres, for the enormous quantity of red fume given off, and for shots of iron carried out in the sloppings and slag. The iron blown at Stenay should, by like calculation, lose some 9·70. per cent.

Now, in common American practice, when we use cast-iron which, by calculations like the foregoing, should yield a loss of 6·35 per cent., the

loss, taken over a whole year, rises to 12 per cent.; and this, though we lack the red smoke of the Robert practice, and though our steel is cast in large ingots, while the Robert steel is cast in small castings. But in many well conducted iron foundries the loss due to sandage, to slagging in the cupola, and above all to the large proportion of shots produced in making small castings, amounts to 10 per cent.; and this although the composition of the castings is very nearly that of the cast pig-iron treated.

Taking these thing into consideration, I should expect at the very least 16 per cent., and more likely 18 to 20 per cent. of loss in the Robert vessel, as reported at Weissnichtwo, instead of the loss of from 11·5 to 15 per cent, reported in France.

The following numbers and the diagram, Fig. 3, indicate the progress of removal of the non-ferrous elements in the Robert vessel at Weissnichtwo:

	Cupola charge.	Vessel charge.	14′ 45″	15′ 45″	16′ 45″	17′ 45″	Finished steel. 21′
Carbon	....	....	1.75	1.60	1.60	0.92	0.42
Silicon	2.05	1.96	0.69	0.63	0.51	0.31	0.13
Manganese	1.08	1.20	.94	0 83	0.75	0 52	0.69
Phosphorus	0 06	0 06	0.06	0.06	0.05	0.05	0.06
Sulphur	0.06	0.03	0.02	0.02	0.03	0 03	0.03
Silica	....	....	63.1	63 6	64.9	62.1	....
Lime	....	....	1.8	1.5	1.7	1.5	....
Ferric oxide	....	....	12.2	12.2	10 3	12.8	....
Iron	....	...	8.7	8.5	7.2	9.0	....

The following numbers give the composition of the metal in the Robert converter, taken shortly after the first drop of the flame in several successive heats. I have changed the order of the heats so as to bring the different samples in the order of the length of time after this drop of the flame. when they were taken. The first column gives this length of time:

Time after first drop of flame.	Si.	S.	P.	Mn.	C.
1′ 0″	0.20	0.07	0.06	0.13	1.27
1′ 30″	0.03	0.03	0 06	0 14	1.12
2′ 0″	0.09	0.01	0.05	0.10	1.00
2′ 15″	0.22	0.03	....	0.21	1.08
2′ 30″	0.07	0.03	....	0.19	0.78
3′ 15″	0.08	....	0.07	0.16	0.62
3′ 15″	0 08	0.03	0.05	0 22	0.60

Without here examining these numbers in detail, one fact strikes us: While the reasonably regular decrease in the proportion of carbon indicates that this first drop marks some pretty definite point in the decarburation, the altogether abnormal variations in the proportion of manganese point to considerable irregularity in the process. The behavior of the silicon, too, is far from regular. Looking back, now, to the irregular removal of carbon and manganese in fig. 3, and in the table which accompanies it, where we also see some irregularity in the proportion of phosphorus and sulphur, we ask, is not this irregularity just what we might expect from a vessel which follows the apparently unwise plan of trying to act on the different parts of the bath successively, instead of simultaneously as the Bessemer vessel does? H. M. H.

THE USE OF EXPLOSIVES IN FIERY MINES.

The North of England Institute of Mining and Mechanical Engineers has published a translation of the report of the French Commission on the use of Explosives in the Presence of Fire-Damp in Mines.

The report gives a brief synopsis of the work of the English, Prussian and Austrian commissions on the same subject, and an elaborate review of experiments made by the French commission. The final chapter gives the conclusions warranted by the researches of the commission as follows:

1. Blasting-powder, even fired in the midst of water, can ignite mixtures of fire-damp and air.

2. Most of the known explosives, detonating unconfined, are liable to ignite fire-damp mixtures; dynamite, military or mining gun-cotton, particularly the latter, blasting-gelatine, gelatine-dynamite, and ammonia-dynamite of Paulilles are in this category.

3. It is possible, however, to find explosives which detonate at a temperature low enough not to provoke, at least in the great majority of instances, detonating unconfined, the ignition of fire-damp mixtures. Among the explosives tested by the commission which realize these conditions, more or less perfectly, may be mentioned:

(1) Intimate mixtures of 50 per cent. of dynamite with 50 per cent. of crystallized carbonate of soda; sulphate of soda with 10 equivalents of water; ammonia-alum; or sal-ammoniac.

(2) The proxyline powder from Moulin-Blanc.

(3) The mixture of 20 per cent. of dynamite (75 per cent.) with 80 per cent. of nitrate of ammonia.

(4) The mixture of 20 per cent. of gun-cotton (= ·68 cubic inch of NO_2 per grain) and 80 per cent. of nitrate of ammonia.

(5) Bellite, the composition of which is not known with perfect certainty, and which, as yet, has undergone an insufficient number of tests.

(6) Favier explosive, made of about 90 per cent. of nitrate of ammonia, and 10 percent. of mononitro-naphtalene, which appears likely to equal bellite as regards safety, but whose intermediate detonator, such as has been submitted to the Explosive Substances Commission, should be suppressed, and upon which further experiments should be made.

4. By reason of the complexity and the lack of certainty of the phenomena which may attend the detonation of unconfined explosives, it will always be prudent to avoid firing shots (even charged with one of the explosives considered the safest) at a point where the mixture of fire-damp and air may be inflammable. The choice of these explosives should be considered as considerably lessening the danger of explosion; it should not be considered as absolutely suppressing it.

5. Explosives must always be used under the conditions which allow them to develop the maximum of useful work. Both economy and safety agree in the recommendation of this rule.

Consequently, the explosive must be carefully stemmed at the bottom of the shot-hole, which must be deep enough; the leaving of an empty space either in front of or behind the cartridge, or on one side must be avoided; contact must be avoided between the explosive and the Bickford fuse, if the detonator is fired by that means, the danger of which is besides serious enough to make it desirable to replace it by a safer means of firing.

The commission had not to consider matters of management. It may be seen, however, that the preceding conclusions tend to the abandonment of blasting powder in fiery mines, and even to throw suspicion on ordinary dynamite. blasting-gelatine, and ammonia-dynamite, as now manufactured, blasting-gelatine appearing to be the most dangerous of all these substances.

The explosives which can best be recommended as regards safety are dual mixtures of an explosive such as dynamite, gun-cotton, or dinitrobenzol, with nitrate of ammonia. The mode of manufacturing these mixtures, the manner in which they can be protected from atmospheric moisture, and the greater or less duration of their resistance to this influence ought to be tested. It will also be necessary to test the useful effect of these mixtures in practical experiments, the manner in which they act in breaking down stone, and more particularly coal. The study of these questions will require experiments, most of which can only be made at the mine, and by the managers.

The commission expresses the desire that the government powder mills should manufacture a sufficient number of cartridges of these various explosive mixtures, to be distributed to those managers who would be willing to try them in a practical way.

The trials finished, there would remain the question of the manufacture on a large scale. For some of the mixtures which appear to possess good enough guarantees of safety, such as gun-cotton and nitrate of ammonia, the government powder mills have the monopoly of manufacture.

The mining industry, moreover, would only gain from the establishment of an active competition in the manufacture of the explosives, at present almost an actual monopoly. This advantage will be still greater when it is a question of mixtures, the comparative safety of which depends upon the exact proportion of the mixed substances, which is difficult to regulate.

The commission, therefore, expresses the view that the government powder mills should take measures to supply to the trade those mixtures based on gun-cotton recognized as advantageous as regards the safety of fiery mines.

MINERAL RESOURCES OF URUGUAY.

The following is extracted and translated from the *Anuario Estadistico* of the Republic of Uruguay, 1888:

This soil is very rich in minerals, metals, clay, and combustible minerals. Gold, silver, copper, iron, tin, and mercury are found among the first. Granite, mica, feldspar, various and precious agates, calcareous stone, mountain-rock crystal, marble of different colors, slate, lithographic stones, alum, gypsum, cobalt, calcareous cement, lodestone marble basalt, and columbite of great value, discovered by Mr. Lettson. A quantity of flints and crystallizations similar to rubies, topaz, zirconite, and emerald, which appears in glittering points in pyramidal shapes, is found in abundance in our mineral kingdom. The mineralogist, Henry Petivenit, found gold, topaz, and diamonds in the river San Francisco, which runs through Minas, and Mr. Lettson, gold in the departments of Salto and Tacuarembó.

From 1852 up to date several mines were denounced, and samples of minerals were extracted from many places.

The working of a lead mine was tried in Soldado, and at present a French company works the gold mines of Cuñapirú. Another company works a copper mine in the Department of Maldonado.

The existence of gold has been known since the last century.

Gold in veins is found in quartz and also in nuggets. By the source of the Arapey and Gueguay rivers begins the region of the quartz stone and agates, amethysts, and glittering flints.

Black basalt, calcareous stone and marble are plentiful.

The following is taken from "the Republic of Uruguay, 1888-89," issued by the Consulate-General of Uruguay in London:

So far the mineral resources of the country have attracted little attention, owing specially to the difficulties of transport of machinery to the mineral regions. Some years ago a powerful French company spent many millions of francs working the gold mines of Cuñapirú. Its progress was very slow, but now that the means of transport have improved, and the company is better managed, the prospects of success are brighter. Since then a company denominated "The Gold Fields of Uruguay," with headquarters in London, is exploring the same region. The Central Uruguay Railway Extension Company to Rivera, which is in progress, will run through the very center of the district. Mr. Lettson, late British Minister at Monte Video, states that the silver minerals of the country contain 87 per cent. of silver, copper ore 50 per cent., and magnetic iron ore 72 per cent. of their respective metals.

The following is extracted and translated from *La Republique Orientale de l'Uruguay*, by Ernest Van Bruyssel:

Several of these mountains, especially those of Cuñapirú, contain auriferous quartz, and on several occasions gold has been extracted by means of washing. Several efforts were made to work the mines regularly, but without sufficient resources to insure success. A French company, with chief offices in Paris, with a capital of two million dollars, was formed to work the mines of Cuñapirú, and sent operatives and machinery, but we have not been able to obtain full information about the success of the operation. From what we have heard, it went no further than to wash the mineral furnished by private enterprisers, or to purchase from the latter.

In the same district, which is one of the most interesting of the country by its geological constitution, platinum, silver, copper, lead, antimony and cobalt are found; also iron ore, agates of a variety of colors, marble remarkable by its whiteness, manganese, etc., etc.

From Laronsse's Dictionary of the XIX. Century:

Writing of the mineral wealth of Uruguay, Mr. Laronsse says: "The country has been largely endowed by nature with mineral wealth to the formation of which its geological constitution is particularly adapted. Deposits of argentiferous lead, copper, antimony, silver and gold are found in abundance, the latter existing principally in the department on

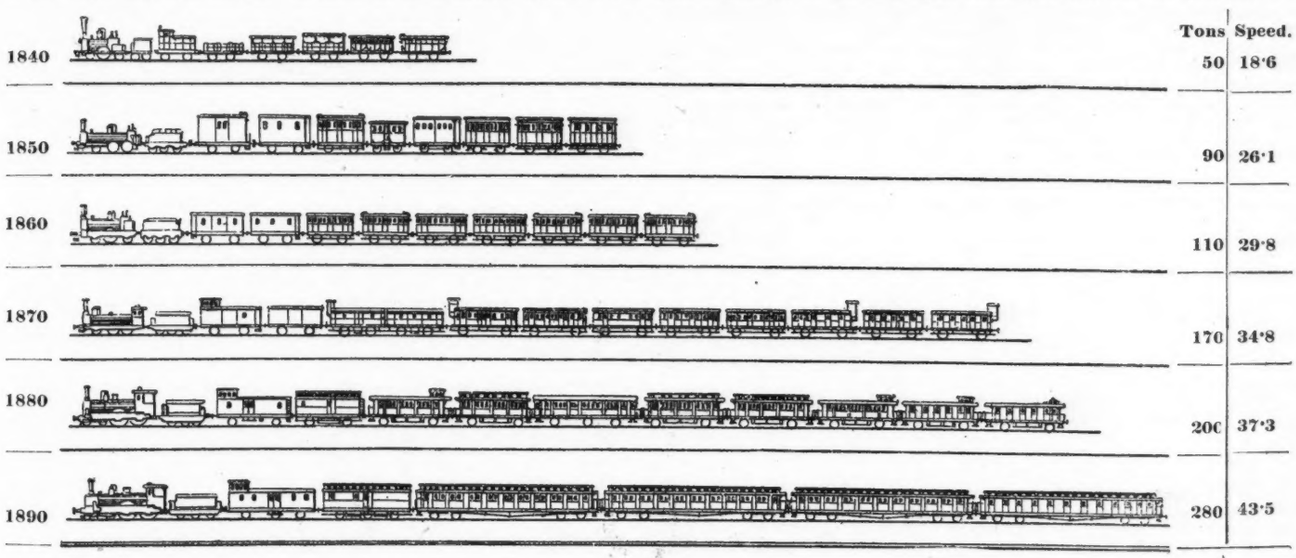
the Brazilian boundary, where auriferous quartz particularly rich in the metal is found. The rivers springing from the 'Cuchilla Grande' chain of hills carry gold in powder, the collection of which gives very good results. At present, owing to the want of hands and to the great advantage offered by cattle breeding and sheep rearing, the working of mines, which constitute the future of the country, is much neglected. There are numerous calcareous beds in the country, in different states of combination, both as sulphates and carbonates. As regards the latter there is a great variery of beautiful marble, such as white marble for sculptural purposes, and colored marbles which are getting scarce in Europe. There is also a great variety of splendid agates, which are exported to Europe in considerable quantities."—*The South American Journal.*

DEVELOPMENT OF RAILROAD TRAINS.

The appended illustration of the Austrian trains since 1840 we borrow from *Wochenschrift d. Oesterr. Ingenieu- u. Arkitekten-Vereines* of Dec. 27, 1889. The 1890 train represents, however, no actuality, as Herr von Hornbostel said, when showing this comparative diagram at the meeting of the Engineers' Society, but is a sketch of the train to come, being only the desideratum for 1890. The speed indications include stoppage at stations and give the ordinary schedule, not maximum speed.

The cut is reproduced in the London *Engineer* of August 8 as illustrative of the growth of BRITISH trains. No speed is given, and the tonnage is raised so as to read: 1840, 55t; 1850, 99t; 1860, 121t; 1870, 187t; 1880, 220t; 1890, 308t.

We think the *Engineer*, while changing the word Austrian to British, should also have changed the dates, substituting 19 0 for 1880 and 1910 for 1890, for at the rate of progress in length of British cars shown during the last twenty years, it will take twenty years more before they are of the length shown in the cut. In the Paris Exhibition, last year, it was noticeable that the Continental railways were rapidly approaching American practice in length of cars, but the British cars were still a long way behind.



GROWTH OF AUSTRIAN TRAINS.

ALUMINUM IN WROUGHT-IRON AND STEEL CASTINGS.*

By W. J. Keep, Detroit, Mich.

I.—ALUMINUM IN REMELTED WROUGHT IRON.

Those who have seen the Mitis wrought-iron castings made in Sweden, or during the year 1885 at the foundry of the Worcester, Mass., Malleable Iron Company, can feel only admiration of their beauty and perfection. In the patents for the process, it is declared that an exceedingly small percentage of aluminum added at a certain time, under certain conditions, will produce such castings.

In a small circular regarding Worcester Mitis, the tensile strength and elongation are given; and in another circular, published in 1885, analyses of Mitis, by Dr. Edward Riley, show as an average of seven samples: carbon, 0·099; silicon, 0·100; phosphorus, 0·153, and manganese, 0·022 per cent. No aluminum was found in this metal. It will be noticed that the above average of elements is about the same as the analysis of ordinary wrought-iron with the slag removed. The silicon and manganese are a little high. If the castings in Sweden, England and Worcester had been made with additions of silicon and manganese, or silicon alone, the extremely high temperature of the molten metal would have volatilized or oxidized most of the additions, so that the resultant metal should have had a composition similar to the above average.

It is stated by the owners of the Mitis patents that, by remelting, the same result cannot be obtained, owing to the escape of the elements which prevented blowholes in the first melting.

If aluminum had been introduced it probably would not have escaped and would have prevented blowholes, when the metal was remelted.

If the Worcester Mitis had been produced by additions of the high grade ferro-silicon which it is said that they used in their works for some purpose, it seems probable that with the skillful management that controlled the operation just such beautiful castings could have been made.

Just about this time (1885) the Cowles alloy of aluminum and iron came upon the market. This consisted of carbon about 2·01; silicon, 3·86; and aluminum about 10 per cent.; the remainder being iron. It has been proved that aluminum and silicon work together in the same direction; and this alloy was especially adapted to the making of castings from melted wrought iron.

We are anxious to obtain Mitis castings in the shape of our test bars, but we could not obtain castings made from our patterns. A letter from one large company, dated March, 1889, says: "The process so far has not yielded entirely satisfactory results, when the attempt has been made to melt a very low-carbon wrought iron."

About this time we chanced to meet one of the agents of the Mitis Company, who agreed to have the castings made as we wished.

When told that we would furnish him all of the "J. B." wrought iron and pure aluminum that he wanted for the work, he said that he should not know how to go to work with pure aluminum, and asked to be permitted to use the Cowles alloy, as they needed the other elements which that alloy contained. He said that if he were to try pure aluminum he would begin with 0·25 per cent. and see what that would do. All this showed plainly that they considered an addition of carbon and silicon desirable.

We therefore conclude that castings of wrought-iron and aluminum have not been made, or at least that no account of tests of such castings has been published. We shall present positive proof that very small percentages of aluminum will accomplish wonders, and also that it does not fail to act in remelting.

Small quantities of aluminum in wrought iron will prevent blowholes and will make stronger castings.

The results of an experiment prove that it is not the addition of a small quantity of aluminum just before pouring, but the presence of the aluminum in the iron, which produces the results. At our request the owners of the Robert process for making ingot iron made test bars for us of this metal.

At the same time that the above castings were originally made a second ladle of iron was caught, into which was put a three-ounce piece of aluminum, after which another set of test bars was made.

Owing to a mistake in proportioning the gates, these bars (as well as the first set) were cracked. We therefore remelted these and cast other test bars from correctly made patterns. The results from the tests of these bars are given in the appended table.

By calculation, the amount of aluminum in these castings was 0·20 per cent. Dr. Mabery found the total carbon to be 0·31 per cent. The castings were perfectly solid. In the first cast, the grain of the metal alone was very coarse, but the cast containing aluminum was very fine and homogeneous.

The aluminum has made the grain close and uniform, removed all blowholes and raised the ultimate strength 55 per cent., and the limit of proportionality from 250 to 400. Elasticity at the limit of proportionality is the same in each. Rigidity is raised from 81 to 84 degrees. Viscosity or tendency to flow is greatly diminished. Power to resist shock is almost doubled.

As any ingot iron can be taken directly from the converter and poured into the molds, this experiment shows what a wonderful influence aluminum is destined to exert on the steel casting business, and the fact that such a casting can be remelted and made into perfectly solid castings shows that the aluminum remains in the metal, and that its effect is lasting.

The tests which we shall next describe will, together with those which we have already presented, prove that an exceedingly high melting temperature is necessary for the production of the best castings. The Detroit Steel and Spring Works, through their manager, Mr. Alexander DeLano, after hearing of the tests which we desired to have made, allowed their superintendent of melting, Mr. J. W. Allison, to make the casts for us. We prepared the molds of graphite, and he placed in a plumbago crucible 80 pounds of "J. B." wrought iron, which was supposed to contain about 0·087 of carbon and 0·056 of silicon.

* Abstract of a paper read at the Washington meeting of the American Institute of Mining Engineers.

We placed upon the iron platform, near the furnaces containing the steel pots, molds marked 1, 2, 3, 4 and 5.

It is doubtful whether we would be able to fill the mold No. 1 with melted wrought iron, and much less any of the others.

We had attached to the ends of four long sticks of carbon, each one inch in diameter, pieces of aluminum. A three-ounce piece for cast No. 2; a seven-ounce piece for cast No. 3; five ounces for cast No. 4, and three ounces for cast No. 5. If we could make each mold take 13 pounds of iron, these additions would make cast No. 1 contain no aluminum; cast No. 2, 0·25 per cent.; cast No. 3, 1·00 per cent.; cast No. 4, 2·00 per cent., and cast No. 5, 3·00 per cent. of aluminum.

The molds were filled as follows: after the wrought iron had been in the furnace six hours it was found to be melted and was withdrawn. The first mold was filed, leaving 67 pounds of iron in the pot. This was set down on the iron floor and the first stick of carbon was handed to the melter, who stirred in the three-ounce piece of aluminum and then poured the second mold. This should have left 54 pounds of iron in the pot. The character of the metal had not materially changed; it had not lost any of its fluidity. The pot was again set down, the seven-ounce piece of aluminum was stirred in and the third mold poured. The metal had become whiter and more fluid. There should have been 41 pounds of iron in the crucible, and this was again set down, the five-ounce piece was stirred in, the fouth mold was poured and the pot set down, when there should have been 28 pounds left. This metal was hotter and more fluid than any previous heat. After stirring in the remaining three-ounce piece the iron became still more fluid and more white. When the last mold, No. 5, was poured, 15 pounds was left which was poured out on the platform, running into a plate about half an inch thick.

At each stirring in of aluminum, not only was the aluminum melted, but the stick of carbon was heated white hot.

Eighteen ounces of aluminum were melted and four sticks of carbon were raised to white heat, yet the last 15 pounds poured was more fluid than the first 80 pounds, which would hardly run.

Owing to the uncertainty of determinations of small percentages of aluminum the result of the analyses of cast No. 2 is not given in the appending table. Owing to the piping of the metal in the mold, each cast did not contain 13 pounds, thus leaving more iron in the pot after each cast than we expected. This reduced the percentage of aluminum in each cast below what we had calculated. The reduced percentages are not, therefore, necessarily due to any loss of aluminum.

REMELTED WROUGHT-IRON CASTINGS.

Analytical and Physical Results of Tests of Iron Low in Carbon combined with Aluminum.

	No. of cast.	Aluminum.	Total carbon.	Graphitic carbon.	Combined carbon.	Ultimate strength.	Limit of proportionality.	Deflection.	Elasticity.	Permanent set.	Rigidity.	Hardness.	Shrinkage.
Robert ingot iron.	Alone	0·00	0·35	0·04	0·31	400	250	·20	·125	·075	81°	45	·220
	With aluminum	0·20	0·31	....	....	700	400	·15	·13	·03	84°	45	·220
Remelted Wght iron	Cast 1	0·00	0·29	0·12	0·17	200	50	15	·11	·04	75°	44	·292
	" 2	.	0·32	0·11	0·21	250	....	13	·09	·04	78°	44	·281
	" 3	0·58	0·33	0·085	0·245	430	250	·21	·115	·095	82°	42	·273
	" 4	1·61	0·37	0·12	0·25	390	250	·17	·10	.07	83°	41	·282
	" 5	2·45	0·30	0·12	0·18	590	450	·185	·116	·015	84°	30	·259

The casts contain more carbon than the "J. B." iron was supposed to contain, and the metal no doubt took this from the crucible during the six hours that it was in the fire.

The carbons do not seem to be affected by the aluminum in any way.

In cast No. 1 the remelting entirely removes the fibrous character of the original metal, and, as the slag was all removed, the iron was changed to ingot iron. The castings and runners were full of blowholes, and the mold was not nearly filled. We remelted this cast, and found it to melt much more easily than the "J. B.," which we had not before been able to make fluid in our furnace. We cast a very good test bar.

The bar contained one blowhole, extending from end to end. This imperfection caused the bar to show much less strength than if it had been solid; and this hollowness may have changed the other results.

The surface of the casting was very rough, being covered with cavities caused by bubbles of gas. (All remelts are cast in ordinary green-sand molds.)

In cast No. 2 the original casting was full of blowholes, and did not run full. The remelt had a larger hole through its center than the first cast. This does not prove that, with more heat, this percentage of aluminum would not have made a solid casting, for the Robert iron, with less aluminum, was perfectly solid.

We intended that cast No. 3 should contain 1 per cent., but owing to too much metal remaining in the pot it contained only 0.50 per cent. aluminum. This casting was practically sound. Its shrinkage is reduced to 0·273, although there seems no reason for its being so low.

Cast No. 4 should have contained two per cent., but actually had only 1·61 per cent. of aluminum. This cast was solid, with a shrinkage of 0·282. This shrinkage is higher than it should have been. We were obliged to remelt this three times before we procured a good set of bars and this may have influenced the shrinkage. All analyses were of the metal after the first mixture. The final castings have never been subjected to chemical analysis, it being thought that the physical tests prove conclusively that the aluminum is still present.

Incast No. 5 the aluminum should have been three per cent., but was only 2·45. The casting of the remelt was smooth on the surface and perfectly solid. It melted almost as easily as the white cast iron. We succeeded in casting a thin companion bar. The shrinkage of the square bar, s reduced to 0·259, while the thin bar had a shrinkage of 0·290, showing that the rapid cooling increased shrinkage, but we could find no tendency to chill. The hardness is reduced to 30. This metal could be drawn out and welded; was bent double when cold, and was in every way a good ingot iron. The fracture of the bar exhibits a fine, compact crystalline grain, like good steel. The metal left in the pot after the mixture showed crystals with flat facets one-eighth of an inch across. We thus find that we have gone about as far in adding aluminum as it is wise to go. The fusibility of the alloy is low enough to allow it to be easily melted. Its strength is higher than any iron we have tested, unless it has been strengthened by rolling. The bar shows other characteristics not shown by the previous casts.

To ascertain the effects from greater percentages of aluminum, we began at the other end of the series, by adding 10 per cent. of the same wrought iron we have just considered to 90 per cent. of aluminum. The shrinkage was 0·161 for the square and 0·153 for the thin bar. It was not so strong as aluminum alone and was very brittle. The crystals had flat, shining facets and were very large.

We then made the proportion of iron 25 per cent. The shrinkage was 0·142 for the square and 0·127 for the thin bar. The crystals were mixed and the metal would hardly hold together.

We next made the proportions half-and-half. The bars broke by their own weight. The shrinkage of the square bars was 0·241, and the thin bars crumbled too much to be measured. These bars were left in a package for three months, when they had fallen to a fine powder.

This tendency to large cleavage which became prominent with 2·45 per cent. of aluminum, and which proved so deleterious with larger percentages of aluminum, would indicate that for an iron and aluminum alloy the limit will be about three per cent. of the latter, or perhaps a little higher.

We find, also, that with molten iron comparatively free from carbon a very high temperature is necessary to enable a percentage of aluminum as small as one-quarter of one per cent. to make perfectly solid castings.

II.—ALUMINUM IN STEEL CASTINGS.

The preceding portion of this paper has treated of the influence of aluminum of iron containing about ¼ of 1 per cent. of carbon. Iron containing 1·5 per cent. of carbon would be a high-carbon steel, and could be forged and welded, but probably with difficulty. This percentage would be only one-half the carbon which would be contained if the iron was saturated with carbon.

Exactly the same course was pursued which was taken to get the aluminum into the wrought iron, and a review of that description will apply equally well to this series of casts.

Enough carbon was added with the 80 pounds of "J. B." wrought iron to bring the carbon in the steel to 1·50 per cent.

As in the former case, the molds did not take as much metal as was expected, owing to piping; and the percentages of aluminum in each cast were therefore lower than was calculated. The casts were numbered 6, 7, 8, 9, and 10. After each addition of aluminum the metal grew more fluid and apparently hotter.

We here refer to the analytical determinations by Dr. Mabery in the table following:

STEEL CASTINGS.

Analytical and Physical Results of Tests of Iron High in Carbon combined with Aluminum.

	No. of Cast.	Aluminum.	Total Carbon.	Graphitic Carbon.	Combined Carbon.	Ultimate Strength.	Limit of Proportionality.	Deflection.	Elasticity.	Permanent Set.	Rigidity.	Hardness.	Shrinkage.
Blue Castings.	Cast 6	0·00	1·52	0·34	1·18	440	225	·135	·115	·02	83°	40	·255¼
	" 7	0·	1·27	0·20	1·07	450	50	·135	·115	·02	83°	44	·255
	" 8	0·87	1·19	0·27	0·92	800	400	·315	·22	·095	83°	52	·245
	" 9	2·11	1·35	0·085	1·27	740 flaw.	500	·22	·20	·02	83°	50	·257
	" 10	2·52	1·39	0·08	1·31	1010	400	·33	·30	·03	83°	52	·266

Owing to the uncertainty of determinations, of small percentages of aluminum, the result of the analyses of cast 7 and cast 2 is not given. Our tests prove its presence in these casts.

It will be noticed that aluminum expels carbon; but this is due to the expulsion of graphite already in the molten metal, and not to the change of combined into graphitic carbon. The combined carbon is even increased.

Owing to the influence of 1·50 per cent. of carbon cast No. 6 ran full.

Regarding cast No. 6, as separate bars were tested for both weight and impact, these tests can be compared. As no manganese was added with the carbon the grain is very coarse. The shrinkage is very irregular. It sustains impact remarkably.

In cast No. 7 the addition of 0·25 per cent of aluminum removes all tendency to blowholes, but seems to make the metal less able to withstand strain.

So far the deterioration is only apparent in the lack of proportionality, and this lack is also shown by the impact test, where the bar takes set at almost the first blow. The breaking blow was only 2¼ against a 3¼-inch fall in cast No. 6. The texture of the steel is slightly more regular and is of finer grain.

Cast No. 8 contains Al. 0·87; total C., 1·19; graphitic, 0·27; combined C., 0·92. We had only one bar, and first applied weight up to 600 pounds. It was proportional to 400. Rigidity was 83 degrees. The bar rested from July 15th until September 1st, and without being straightened the same bar was tested by impact up to a 2-inch fall. It seemed to take set at the first blow. The bar was then tested without straightening by weight until rupture. This is a remarkable metal. At 700 pounds it is quite plastic. The grain of the metal has become quite fine.

In cast No. 9 there was a slight blowhole in each of the two bars obtained. The grain is white and very fine and uniform, like the very best steel.

Cast No. 10 contained Al, 2·52; total C., 1·39; graphite; 0·08: combined C., 1·31. The bar did not run quite full, the corners being round. We suspected that if it had not been for the flaws in the bars of cast No. 9 the

strength would have exceeded that of cast No. 8. This suspicion is proved to be correct by the test of cast No. 10. We first tested the bar to 400 pounds, and, finding that it had taken no set, made a partial impact test up to a 3-inch fall, still with no set. We then tested it by weight until it broke. Ultimate strength, 1,010 pounds.

This is the strongest metal in the whole series, and the surface of the casting was perfectly smooth, although it was run in an ordinary green-sand mold. The grain was a most beautiful white, like the very best steel.

We remark generally that in the original bars cast after the mixture, each cast from No. 6 to No. 10 was more brittle than the one preceding it. In striking a bar a blow on the anvil, especially cast No. 10, it would fly into several pieces. Whether it was more brittle than the remelt we cannot tell, but it would seem from the records that remelting was of very great benefit, the grain being finer and the strength being increased. The records of impact are not complete enough for us to draw definite conclusions regarding the ultimate strength under shock. We think, however, that metal with small percentages of Al could resist less shock than with no Al, but that where the percentage passes one per cent. the ability to resist shock increases.

The influence of percentages of aluminum, less than three-quarters of one per cent., is not proved, but the indications are hardly favorable. For percentages exceeding that amount, and up to 2·50 per cent., everything is favorable. The carbon reduced the shrinkage. Aluminum has hardly any influence on shrinkage, and certainly does not lessen it. The strength is more than doubled, and increases with each addition of aluminum. Proportionality probably does not increase with the additions. Power to bend before breaking increases as aluminum increases, and this is also true of elasticity. The set is about the same for all casts.

It is remarkable that rigidity is the same, whatever the percentages of aluminum. Hardness seems to increase as the percentage of aluminum increases.

These ten casts prove that the alloy of iron and aluminum, whether carbon be present or not, is a more wonderful alloy than even aluminum bronze, and that it opens up an immense field for the use of aluminum, whenever that metal can be obtained at a figure permitting the alloy to be sold at a low price.

The manner of adding the aluminum, and the fact that in each case the resultant alloy was remelted, proves conclusively that aluminum remains in the metal, and exerts the same influence on subsequent heats as it did on the first.

THE PRODUCTION OF TIN.

In the very earliest commerce of the world tin held an important position. It entered into the composition of the bronze, which was the universal material for arms and armor long before the Greeks made their famous voyage to Troy. We know that the Phœnicians braved the dangers of the Bay of Biscay to obtain it, and doubtless there were other sources less distant than Cornwall from which the people of the ancient world obtained this necessary commodity. Tin is pretty widely distributed in Europe. It was worked in the twelfth century in Bohemia and in the Meissen district of Germany. It is also found in Saxony, in France, in Sweden, in Spain, and of course in Cornwall. Devon and Somerset, England. In Southern Asia, and in Siberia, there are extensive deposits of tin ore, while it is also found in Madagascar, Burmah, Australia, Peru and China, Brazil, Bolivia, Tasmania and Chili. In the United States it is found in the states of Massachusetts, New Hampshire, in the magnetic ores of New York, New Jersey, Missouri; also in the vicinity of King's Mountain, North Carolina; in the gold-bearing formations of Virginia; also in Dakota, Wyoming, Utah and California. Many of the sources we have enumerated cannot now be worked profitably, but it is possible that in the early ages of the world they provided the local supplies.

It is estimated that the consumption of tin in the year 1888 amounted to 52,500 tons, distributed as follows:

	Tons.
United States	16,000
Europe	8,000
Other countries	6 000
Used for tin plates	22,500
Total	52,500

The first three items refer to pig tin only, the tin used for tin plate being separately enumerated in the fourth line. It is estimated that another 4,000 tons would be in store and afloat. The sources of supply are as follows :

	Tons.
Great Britain	9,241
The islands of Banca, Billerton, Sing Kib and Java, Malacca and Siak	27,990
Australia	6,559
Mexico, Bolivia, Peru, Chili, Argentine Republic, Tasmania, China, Spain, France, Belgium, Holland, Germany, Russia, and other parts	12,710
Total	56,500

The amount manufactured into tin plate was distributed as follows :

		Tons.
United States	5,500,000 boxes, weighing	388,300
Great Britain	1 000.000 " "	67,0 0
Elsewhere	1,9.0,000 " "	127,200
Total	8,400,000 " "	532,500

The records of the Cornish mines have been very carefully kept for a long time, and show clearly the history of the industry. During the 147 years ending in 1889, the average output of the country has been 385,000 tons of ore, yielding 7,045 tons (or 1·83 per cent.) of black tin, and 6,240 tons (or 1·2 per cent.) of white tin. The average price of the metal during the period has been £100 0s. 8d. per ton; it is estimated that the average cost of mining and reducing 1 ton of ore to black tin has been 18s. per ton. The average cost of black tin over the period has been £55 3s. 8d., and the cost of producing it £49 2s. 1d.

During the 147 years the total ore mined was about 56,500,000 tons, and from this there were produced 1,035,503 tons of black tin and 684,623 tons of metal. The highest price of metallic tin was in 1823, when it stood at £184 a ton, and the lowest was in 1843, when it dropped to £60 a ton. Since 1869 the output has been very steady; in 1874, 230 mines produced 9,942 tons, this being the highest number of mines worked. In 1886 the number had fallen to 72, yet the production, 9,241 tons, had not greatly decreased. In 1888 the output of 81 mines was 9,183 tons.

Within an area four miles long by three miles broad in the Dolcoath district, there are 51 tin mines, and it is estimated that twenty-five of these mines have made over £5,000,000 sterling in profits from the sale of black tin; one mine alone made £2,000,000. This mine, the Dolcoath, has an output of 200 tons of ore per day, yielding the high amount of 2.4 per cent. of pig tin, as against 1½ per cent. for the average of fourteen other principal mines. It cost £60 per ton of pig to produce the tin from the ore, and the lord's dues amount to £8.

The fact that Cornish mines are under supervision on account of the lord's dues has caused very accurate records to be made of the output for over a long period :

OUTPUT OF CORNISH MINES—1742 TO 1888.

Dates.	Number of years.	Tons of Metal Produced.	Average price—Total value per ton. £ s. d.
1742 to 1799	58	156,533	88 7 3
18 0 to 1847	48	162,981	99 11 5
1848 to 1857	10	90,180	106 4 2
1858 to 1863	6	47,565	123 5 9
1864 to 1869	6	51,510	100 5 0
1870	1	10,200	127 8 6
1871	1	11,320	137 10 2
1872	1	9.560	152 15 0
1873	1	9,972	1 3 7 0
1874	1	9,942	108 8 0
1875	1	9.614	90 2 0
1876	1	8,500	79 10 2
1877	1	9,500	73 3 6
1878	1	10,106	65 12 3
1879	1	9.532	72 6 0
1880	1	8,918	91 5 0
1881	1	8,615	97 9 3
1882	1	9,320	106 14 0
1883	1	9,262	97 1 6
1884	1	9,559	84 11 6
1885	1	9,296	89 7 2
1886	1	9,241	101 8 6
1887	1	9,214	113 0 0
1888	1	9,183	117 5 6
		684,623	Average 100 0 8

The tin ore (black tin) contained in the vein stone (lodes) of 26 of the principal tin mines of Cornwall in 1869 amounted to an average of 47 pounds avoirdupois in the ton, or about 2·1 per cent. of black tin, equal to 1·4 per cent. of pig tin per ton of ore mined and reduced. The amount of ore and waste mined in the period covered by the table was about 70,000,000 tons.

Taking two periods, each of sixteen weeks, in 1888 and 1889, respectively, the average cost per ton of mining ore in 25 of the tin mines in Cornwall was £1 3s. 2d., the lowest being 16s 7d. and the highest £1 12s. There were raised 242,200 tons of ore, which yielded 5.466¾ tons of black tin. During the former period (1888) the average price paid for black tin by the smelter was £88 1s. 10d., and in the latter period (1889) £53 6d. Refined English tin sold from £170 a ton in February, 1888.

A table giving the cost per ton for producing metallic tin from ores assaying from 1 per cent. upwards shows that in Cornwall it does not pay to work a mine in which the ore only assays 1 per cent. of metal or 1¼ per cent. of black tin, and that upon a daily output of 100 tons of ore there would be a loss of £22 11s. 8d. per day. Even at 1 2 per cent. of metal there would be a slight loss of £4 1s. 8d. per day. With 1¼ per cent. of metal the profit would be £23 18s. 4d. a day, and with 4 per cent. the figure rises to the splendid sum of £229 1s. 8d. With percentages varying from 5 to 20, as found at Temescal, in California, the estimated profits rise to sums which perfectly dazzle the mind. This is exactly what estimated mining profits always do, and occasionally the reality is very good, as for instance at the Dolcoath mine, whose shares with £9 12s. 6d. paid stand at £100.

Australia produces large amounts of tin. According to Parliamentary returns there had been imported from that continent, up to the end of 1888, 129,016 tons. The first amount exported was 151 tons in 1872; this rose to 2,472 tons in 1873, and to 5,067 tons in 1874. There was a continuous increase up to 10,964 tons in 1883, from which point there was a steady decline to 6,559 tons in 1888. Tasmania has supplied a large amount of tin, the value of its export between 1872 and 1888 being £4,10 .,-760. The lodes are very rich, and fresh ones have recently been opened out. Hitherto scarcely any deep operations have been attempted. In New South Wales there are considerable placer mines, where the metal is obtained by washing. In the counties of Clark and Gresham, in the district of New England, there are 500 acres in which deposits of tin and gold are found in alluvial wash. By far the most promising tin district of America is that of Temescal, in San Benardino County, California. It is said to bear a striking resemblance to the geological formation of that part of Cornwall in which the most productive mines are situated. Samples from lodes have been assayed by various experts in England and America, the average result being 20 per cent of metal to the ton of ore, which is, of course, enormously above the best results obtained in Cornwall.—*Engineering.*

Slag Cement.—M. Le Chatelier describes in a report made to the Société d'Encouragement on behalf of the Comité des Arts Chimiques, an improved method of manufacturing hydraulic slag cements introduced into France by Henry. The manufacture of a cement of good quality from slags presents this difficulty, that while only vitreous slags have any puzzolanic properties whatever, the most active varieties are those which contain the largest percentage of base. All attempts, however, hitherto made to increase the percentage of lime and alumina resulted in the formation of a crystalline slag which in virtue of its structure is totally inert. Henry has overcome this difficulty by running the highly basic slag into water; the rapid cooling preserves the active amorphous structure; the slag is then finely crushed and mixed with a certain proportion of slaked lime. The report says the product is not much inferior to Portland cement, and may be further improved by the addition of a few per cent. of precipitated silica.

IMPROVEMENTS IN UNDERGROUND PUMPING.*

Under the head of pumping, reference may be made to the development of one department of colliery management which is often beset with many difficulties—namely, underground pumping. Having tried at a number of collieries for this purpose the Parkin and Weston pump, the author thinks it right to state that, after years of experience of its working under many various conditions, it has proved itself one of the most satisfactory to deal with for underground pumping. Another process of pumping by hydraulic power has been introduced by Mr. Moore, of Glasgow. This pump differs from the ordinary hydraulic pump in the fact that water is used for the purpose of transmitting power from the steam engine to the pump.

The mode of dealing with the large quantity of water often met with in sinking pits has always been a matter of great importance, because of the following obstacles which have to be overcome: First, having constantly to lower the pumps, together with a consequent lengthening of the spears or rods; second, the difficulty of keeping the valves and working barrels in order, in consequence of the quantity of solid matter which is necessarily raised with the water; and third, the difficulty of carrying on sinking work with pumping plant always at the bottom of the pit. A special form of sinking pump, recently designed by Messrs. Bailey & Co., of Salford, is now successfully at work at the Cadeby mine in South Yorkshire, and contends with the above difficulties in a very satisfactory manner. The pumps are hung in the shaft by wire cables from the surface and are easily lowered by means of powerful capstans as the sinking progresses. The special feature of this steam pump is that, instead of having an engine, with foundations, connecting rod, quadrant and spears, all liable to wear and tear and mishap, the combined engine and pump is the only thing to be dealt with. Eye-bolts are provided at the top, by which it is suspended from chains or wire ropes, and lowered to follow the falling water. The pump consists of three hollow plungers. The upper pair are stationary, and over them are sliding barrels which are connected to the steam piston. From the lower end of these barrels projects the bottom plunger, working into the third barrel, which is secured by means of connecting rods to the steam cylinder. Thus there are two smaller barrels in connection with the larger ram.

There is a group of valves in the junction between the smaller barrels and the larger ram, constituting the delivery valves; and another group of valves at the bottom of the large barrels, constituting the suction valves. The action of the pump is as follows: As the bottom plunger rises, the water follows it into the lower barrel; at the same time the water in the upper hollow plungers is forced into the rising main. In the down stroke, the water in the lower barrel is forced through the lower plunger and valves into the upper barrels and plungers, and thence into the rising main. Thus there is a continuous delivery in the up and down strokes. One of the upper plungers is open on the top and forms the discharge orifice for the water; and the other is closed, forming an air vessel, which is continuously charged with air through a suitable snifting valve fitted to the side of the pump nearest to that plunger, and below the discharge valves; this snifting valve permits a small quantity of air to be drawn in with every upstroke of the pump. The steam cylinder is fitted with the Davidson slide valve.

Six of these pumps have been supplied to the Denaby Main Colliery, which will raise 300,000 gallons per hour through 300 feet. Each pump has its own winding drum and steel wire rope, enabling each or all of the pumps to be raised or lowered at will. Two shafts are being sunk to a depth of 600 yards, and four pumps are in one shaft and two in the other. Each pump has a telescopic suction pipe, which enables a depth of 9 feet to be sunk without lowering the pump. Another kind of pumping engine, known as the straight line pump, is fixed at the Stanley Coal Company's colliery.

* From a paper on "Recent Improvements in the Mechanical Engineering of Coal Mines," by Emerson Bainbridge, of Sheffield, read before the Institute of Mechanical Engineers.

THE CHEMICAL INDUSTRIES OF MEXICO.

Mexico, although greatly behindhand from an industrial point of view, is slowly progressing, and an account of its condition, which recently appeared in the *Chemiker Zeitung*, is fairly encouraging. The great bar to progress hitherto has been the lack of means of communication. Until quite lately the line from Vera Cruz to the capital was the only one in existence, and its freight charges were consequently prohibitive. Much of the carrying trade of the country is still performed by means of mules. Under these circumstances it is not surprising that chemical manufacture has scarcely existed. Apart from the difficulties of obtaining raw material and distributing finished products, the primitive state of the inhabitants limited their needs to the commonest articles, and there was no inducement to do better. Now, however, the new undertakings are everywhere being considered, and concessions for new railways are being granted, freights will fall, new wants arise, and a market be created. Nothing could be more significant of the movement in progress than the steady fall in the price of coal that has recently taken place. Besides the material improvements, the political atmosphere of the country is clearing, its fiscal regulations are becoming less changeable, the security of property is increasing, and there is altogether more inducement for the capitalist to undertake its development.

The number of chemical products made in Mexico is very small. Among the chief may be reckoned sulphuric, nitric and hydrochloric acids, white and red lead, soda, ammonia and its salts, green and blue vitriol, and the bisulphites of soda and lime; but the quantities are not large, and much is imported. There are three sulphuric acid works in the capital, the management of which is conducted in a very primitive manner. In spite of the fact that there is abundance of excellent pyrites in Mexico, the more costly sulphur is burnt, and there is no sign of a Gay-Lussac or Glover tower in the place. The lead chambers are ridiculously small, and the condensation in consequence is so bad that an output of 200 parts of acid for 100 parts of sulphur burned is reckoned satisfactory, and a few years back as little as 150 parts was obtained. A small enterprising sulphuric acid works, with a chamber capacity of 1,500 to 2,000 cubic meters, properly managed, would do well in Mexico, and would be quite free from serious competition on the part of the existing concerns. It should be placed within easy reach of pyrites, for, in Mexico, no attempt is made to use the sulphur dioxide, the ore being roasted in the open, and any one choosing to do so would probably be able to buy the sulphur at a nominal cost.

White lead, properly so-called, is not made in Mexico, but imported. There is, however, a native product termed "albayalde," which is used in its place, and is made by the following curious process: Litharge is triturated with common salt, and the product washed thrice with water. It is white, but turns yellow on exposure to light. To prevent this it is dried, powdered, sifted and buried in dung. After two to four weeks' treatment, during which time the carbonic acid from the decaying organic matter converts it partly into basic carbonate, it is taken out, washed and ground moist with limestone or gypsum, made into cakes weighing about 0·5 kilogram, and dried. Its color is now permanent, though not pure white. A preferable plan consists in suspending the basic chloride in water and treating it with a stream of carbonic acid, avoiding the cumbrous process just described. Albayalde is a poor substitute for real white lead; its covering power is small, and its tone grayish, probably from the use of limestone. Barytes has not hitherto been found in Mexico. A white lead factory working the Dutch process should pay well.

A DRILL TO CUT SQUARE HOLES.

There have been attempts at various times to devise a drill which would produce square holes as economically as round holes are drilled. The idea has been a favorite one with inventors, but hitherto no great amount of success has attended their efforts. Recently, however, machines for the purpose have been devised that work with some degree of success. Two of them are now on exhibition in London. As described in *Engineering*, they bear a general resemblance to drilling machines; but the spindle, instead of revolving in close-fitting bearings, has a peculiar motion which causes it to cut out a square hole. In the earlier type of the machine the spindle is fed down through a long rotating sleeve. This sleeve is made to follow a path of peculiar form by means of a cam at each end running in a square hole. The method of setting out the cams is thus explained: "A square hole is described equal to the hole to be drilled. From any point in one side of the square an arc of a circle is described with a radius equal to the side of the square. From the points where this arc intersects the sides of the square other equal arcs are described, completing the curve triangle. The square in which the cam is to revolve is now drawn, and from each of the vertices of the curve triangle two arcs are described, which complete the figure shown. The point of the tool, which cuts with one edge only, must be situated beneath one of the angles of the triangle." There are a separate pair of cams and a separate tool for each size of hole to be drilled. Five sets of cams are fixed on the spindle, and any set of them can be placed opposite the bearing-plates. The later form of machine is simpler in its construction, and will drill any sized hole within the range which it covers. In the upper bearing there is a short hollow spindle which is driven by gearing. Through this spindle there passes a long hollow spindle, carried near its lower end in a ball-bearing which allows considerable freedom. At the upper end of the spindle there is a roller which runs in a fixed cam path, and is held up to it by springs, which connect the spindle with the hollow driving spindle. The effect of this arrangement is, that while the spindle rotates, it also rolls round in the ball-bearing, and its lower end describes a geometrical figure. The drill-spindle proper is within the second spindle, and carries a cutter, the cutting edge of which terminates on the center line of the spindle. As the central spindle is raised or lowered, it decreases or enlarges the size of the hole drilled, while the whole drill-head is lowered to give the feed.

THE MACIVOR WHITE LEAD PROCESS.

A recent issue of *Iron* gives the following description of the MacIvor white lead process: Some little time since Professor MacIvor made the discovery that litharge, or oxide of lead, is soluble in a certain alkaline solution, which hydrates the lead, and when in this condition the hydrate combines with carbonic acid gas and forms white lead, or a true basic carbonate of lead, liberating the alkaline solution, which is recovered to attack fresh charges of litharge. Since this discovery was made a further step has been taken in the way of economy in producing the lead. Carbonate ore, which is found in great abundance and may be bought at a very low price, is roasted at a moderate heat. It then yields carbonic acid, the residue being oxide of lead (litharge or massicot) and gangue, or impurities. These are removed by washing, and the litharge is afterwards treated with the alkaline solution. There is thus a cycle of operations tending to the production of pure carbonate in the most economical way.

The manufacture of white lead on this principle has been carried on for the past nine months at the experimental works, 47 Clapham Road, London. The process is very simple. The litharge is first prepared from lead ore, and is thoroughly purified by washing. A charge of the pure litharge is then put into a closed vat, in which are revolving stirrers, and a solution of acetate of ammonia is added to it, and the stirrers are started. This mixture is agitated for six hours, at the end of which time the lead will have been wholly absorbed into the ammonia solution. It is then allowed to settle, and the supernatant liquor containing the lead is pumped over into a second vat, similarly constructed to the first one. In the second vat the solution is submitted to the action of carbonic acid gas, when the pure white lead is precipitated from the acetate of ammonia, which is thus recovered, and is ready for use again. It is stated that the solution has been recovered and used over again fourteen times. If the lithrage is exceptionally pure, one vat only is employed, the carbonic acid gas being introduced into the first one. The result is as in the other case, the production of pure white lead and the recovery of the acetate of ammonia. Whichever way the lead is produced, whether by the aid of two vats or only one, the mother-liquor is next run off, and the white lead is passed through filter presses, to deprive it entirely of mother liquor. The pressed lead then goes to the washing apparatus, where it is agitated for a time in a bath of cold water, and is then allowed to settle, when the water is drawn off. Fresh water is then added, and

the lead undergoes another washing. This process is repeated eight times, when the white lead is found to be sufficiently washed. It is then again passed through filter presses, and is finally submitted to hydraulic pressure, in order to extract all the moisture capable of removal by mechanical means. From the hydraulic presses the white lead is taken to the drying room, where it is dried at a temperature of from 160 to 180 degrees Fahr., when it is ready for use. We thus have a high-class white lead, which equals, and in some respects excels, that produced by the Dutch process, inasmuch as in the latter traces of crystal are discernable, while in the former they are not detectable.

It is claimed that by this new method white lead can be prepared for the market at a cost below that of the pure lead required to make stock lead, and that it can be made in six hours as against four months by the older system. Professor Crookes, F.R.S., Dr. Dupre, F.R.S., Professor Dittmar, F. R. S., and Professor Watson, F. I. C., and other eminent chemists have reported very favorably upon the economy of the manufacture, and the excellence of the product. A further point is that all the operations are carried out in the wet way, so that there is consequently no dust, and danger to health is entirely avoided. This, in itself, is an important consideration, because the coroners' records tell a sad tale of the sacrifice of life in connection with the manufacture of white lead. As regards the commercial side of the question, it is stated that from the moment the ore enters the furnace to be roasted until it reaches the washing vat in the shape of white lead a period of only from eight to twelve hours elapses, while with the Dutch process a period of from three to four months is necessary. Although there is such rapidity in the conversion of the ore into the finished product, not a crystal is to be found in it. In this respect, therefore, the white lead is superior to that made by the Dutch process. On the score of economy of production all that need be said is that, as stated, this pure amorphous carbonate of lead is produced by the MacIvor process at about $10 per ton under the price of the lead metal with which the Dutch process starts. This being so, the process promises to be as great a commercial as well as a scientific success.

THE SCHISEOPHONE.

This instrument, as intended to act as a "flaw sounder," is a modification of Professor Hughes' induction balance, and has been invented by Captain De Place, as stated in the ENGINEERING AND MINING JOURNAL of May 31. Fig. 1 represents an induction coil having a reciprocating core, which can be set in motion by means of a crank, the whole being mounted on a stand with a handle.

Fig. 2 is a diagram of the arrangement. *B* is the core which moves longitudinally in the coil *C*. The core is made to strike the object to be tested. A continuous current is sent through the coil *C* and a coil *D*, the latter being fixed at one end of an induction balance. A similar coil, *E*, sliding on a graduated rod, is connected with a telephone. When the core *B* strikes a sound portion of the metal a certain quality of click will be heard in the telephone. This noise may be reduced to a minimum, or may be extinguished by adjusting the coil *E*. When the core *B* strikes

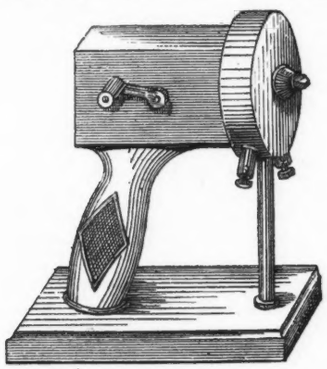


FIG. 1.

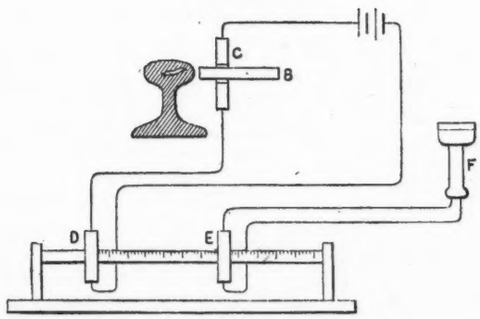


FIG. 2.

DIAGRAM OF THE SCHISEOPHONE.

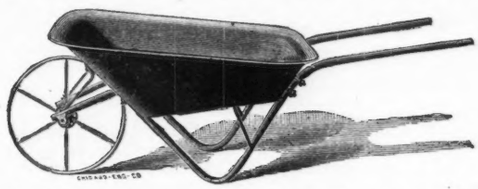
the object to be tested in the neighborhood of a flaw, the sound in the telephone is increased. The instrument is said by *La Nature* to have given very satisfactory indications of flaws in rails at the depot of the Chemin de Fer du Nord; in every instance the rail when broken showed a flaw at the place indicated. We think that the sensitive state of coil *E* ought to be produced not merely by its distance from *D*, but by its relative position between *D* and another coil. A delicate balance at which the click might be extinguished could then be attained, and an alteration either of decrease or increase of the current in coil *D* would give a sound in the telephone. We should imagine that though the instrument may be useful in testing a long homogeneous bar, a change will take place near the ends, and it could not be used for testing an object of irregular shape. —*The Electrician.*

THE LEADER STEEL BARROW.

The cut herewith shows a style of steel wheelbarrow made by the Lansing Wheelbarrow Company, of Lansing, Michigan.

The handles, legs and parts to which the wheel is attached, are made of extra heavy gas pipe, all in one continuous piece, making it very strong and forms a brace at front and back of box.

The legs being curved where they strike the ground, will slide along, if dropped while in motion, instead of catching in the ground and breaking or straining the barrow, as is the case with other makes. Iron



shoes are fitted under the pipe at the place where it would touch the ground, to prevent strain and friction on the pipe. The tray is made of one piece of steel. The company claims to have made over 60,000 wheelbarrows last year.

SOCIETIES.

AMERICAN INSTITUTE OF MINING ENGINEERS.

The fifty-seventh meeting of the Institute will be held in the city of New York, beginning Monday afternoon, September 29th, 1890, at two o'clock.

All sessions will be held in Chickering Hall, 130 Fifth avenue. Hotel headquarters will be at the Park Avenue Hotel, 482 Fourth avenue, where the Institute will also maintain during the month of October a post office and bureau of information for members and guests. Special rates at the Park Avenue Hotel, $3.50 per day. Applications for rooms and all other communications concerning the New York meeting (except such as relate to papers) should be addressed to James F. Lewis, chairman of the New York Local Committee, 23 Park Place, New York.

The following programme is announced:

Sessions of the Institute for the reading and discussion of papers on Monday afternoon and evening and Thursday morning, afternoon and evening.

On Wednesday, Thurday and Friday mornings the sessions of the British Iron and Steel Institute will take place.

On Wednesday afternoon there will be an excursion of the two societies and invited guests upon the Hudson River. (Lunch on board the steamer.)

On Thursday afternoon the Holley Memorial will be unveiled in Washington Square. The commemorative address will be delivered in Chickering Hall, previous to the open-air ceremony, by Mr. James Dredge, editor of London *Engineering*.

On Saturday members and guests will proceed by special train to Philadelphia; on Tuesday, October 7th, to Lebanon and Harrisburg, and on Wednesday to Johnstown and Altoona, arriving Wednesday evening at Pittsburgh, according to the programme of the General Reception Committee.

At Pittsburgh, two joint international sessions will be held, by the two societies and their guests, for the reading of papers. Further announcement will be made hereafter concerning these sessions, and special programmes will be issued by the local committees of Philadelphia, Pittsburgh and the principal points to be visited in the subsequent general excursions.

The general excursion will proceed from Pittsburgh to Chicago, and at the close of the visit to Chicago will divide in two parties, going respectively north and south. According to the programme of the general reception committee, the northern excursion will visit the Menominee, Gogebic and Marquette iron ranges and the Lake Superior copper district, returning to New York via the Sault Ste. Marie Canal, the Sudbury (Canada) nickel and copper mines and Niagara; while the southern excursion will go from Chicago to Birmingham, Shelby and Anniston, Ala., returning to New York via Chattanooga, Tenn., Middlesbrough, Roanoke, Cripple Creek iron mines and Pocahontas coal mines, Luray, Va., and Washington. Both excursions will reach New York about October 28th. All communications concerning the excursions should be addressed to Mr. Charles Kirchhoff, Jr., secretary of that committee. Railway-transportation and sleeping car accommodations will be furnished by the general committee to the members of the Iron and Steel Institute and other invited guests from abroad. Members of this Institute (and others, in the discretion of the general committee), to the extent of practicable accommodation, may obtain tickets entitling them to participate in the excursions and entertainments *en route* at the following rates, which cover railway fares and Pullman berths only, viz.:

New York to Pittsburgh and return, $20.

New York to Pittsburgh and Chicago and return, $30.

New York to Pittsburgh, Chicago, and over the northern or the southern excursion route and return to New York, $60.

Philadelphia or Pittsburgh over either route and return to starting point, $60.

Application, accompanied with check for the amount of fare, must be sent to Mr. Charles Kirchhoff, Jr., 66 Duane street, New York City, on or before September 10.

THE METALLURGY OF STEEL.

The *Ironmonger*, in its issue of August 16th, says: "The Metallurgy of Steel." (New York: the Scientific Publishing Company, 27 Park Place.) This is volume I. of the work by Mr. Henry M. Howe. It is of royal quarto size, is bound in cloth, and contains 380 pages of matter, with numerous well-executed engravings in illustration of the letterpress. If the succeeding volume or volumes bear out the promise conveyed by this volume, Mr. Howe will have produced a monograph on the metallurgy of steel which will be virtually complete up to date, and of very high value to all who are interested in the metal. The work, it may be stated, is dedicated to Sir Lowthian Bell, who is styled "Magister Magnus in Ignibus," as a token of the author's admiration. To a work of this size and scope it is not easy to do justice in the course of a brief review, but we may at least afford some idea of its contents and the manner in which the different branches of the theme have been handled. [Here follows an abstract of the work.]

Taking the work as a whole, it may be said that, whilst it is principally devoted to American practice, and largely records its results, it is a very valuable contribution to the metallurgical literature of the day. In almost all respects it is brought up to date—as witness the chapters on Hadfield's manganese steel and Riley's nickel steel—and contains many specially-made calculations of much importance. We shall await the issue of the balance of the work with interest.

Compressed Air as a Motor for Electric Lighting.—One of the companies in Paris that deal in compressed air for motive power has been awarded the contract for street lighting on a novel plan. The company distributes power through its condensed air system to an immense number of small dynamos, each of which furnishes a current for a small number of lamps.

Submarine Cable Works in France.—The Société Générale des Téléphones, of Paris, France, is about to engage in the business of submarine cable manufacture and laying. Large works, covering more than 5,000 square meters, have been erected at Calais, and the construction of submarine cables will be carried on there continually. A steamer 350 feet long is being built for the company, and will be provided with the most improved machinery for cable laying and repairing.

The Westinghouse Brake on Freight Cars in Belgium.—A series of brake trials has just been concluded on the Belgian State railroads. A train of 50 freight cars, fitted with the quick-acting Westinghouse brake, has been experimented with on the long and steep inclines of the Luxemburg line between Libramont and Jemella. This long train, with loaded and empty wagons, was taken down a grade some 18 miles long with the greatest ease and under perfect control, and the speed was kept practically uniform. Various other trials were made, all equally successful, and in the quick stops the train was brought to rest within 300 yards, much less than the length of the train, from a speed of 41 miles per hour on a falling gradient of 1 in 62. The Belgian State railroads intend to put this train into regular service at once, and contemplate the fitting of a considerable quantity of goods wagons with the Westinghouse brake.

Unfreezable Dynamite.—An unfreezable dynamite is the latest discovery reported. It is said to be the invention of Herr Edw. Liebert, Berlin, and the particulars of it will shortly be published. The difficulty of thawing dynamite when it is once frozen has constituted one of the greatest dangers in its use. Her Majesty's Inspector of Explosives, referring to the accidents occasioned by thawing dynamite, says, "We fail to see what can be done to diminish this class of accidents;" and again, on another occasion, "In view of the extending use of this class of explosive (ordinary dynamite) it is scarcely reasonable to anticipate that the accidents under this head are likely to diminish." The invention has been examined by Sir Henry Roscoe, M. P., and other experts, and is considered by them a valuable one.

A company to work Mr. Liebert's patents has lately been formed in London under the name of Unfreezable Dynamite Company, with a capital of £150,000. It is the intention of the company to dispose of the letters patent for the United States.

Rope Transmission for Driving Dynamos.—The use of rope transmission for heavy drives is steadily extending, and from use in cotton mills and similar factories it is working its way into the dynamo room. In the new office building erected on the site of the old Chamber of Commerce, Chicago, the electric lights for the building are furnished by a plant consisting of two 150 horse power Corliss engines, each driving an independent jack shaft and from each jack shaft are driven two 800-light dynamos. The drive from engine band wheel to pulley on jack shaft and from jack shaft to dynamos is by means of rawhide rope. The rope drive is of the continuous type (one rope for each dynamo) and the slack is taken up and proper tension given by passing the rope over a rope wheel or sheave on one of the Link Belt Machinery Company's suspended single track tension carriages. The rope sheaves from which the dynamos are driven are fitted with disk friction clutches so that either one or both dynamos can be run as desired. It is claimed for the rope drive when used for driving dynamos that it produces a much steadier light than when belts are used, and almost entirely noiseless.

Malleable and Ductile Bronze.—A patent has been taken out in England and France by Messrs. Sentex, C. Marechal and A. Saunier, for a process for producing malleable and ductile bronze bars or plates which are free from cracks and blowholes, are "inoxidizable," and which may be "rolled and drawn with the greatest ease." One and a half kilograms of tin are purified by melting under nitre. Ten kilograms of copper are melted, and 50 grams of equal parts of nitrate and cyanide of potassium are added, for the purpose of reducing the oxide. Then 25 grams of bitartrate of potassium, with the same quantity of cyanide, are added, and, after poling, the tin is introduced, 25 grams each of sal-ammoniac and cyanide are thrown on, one gram of "phosphuret of copper" introduced to "impart mildness," and 20 grams of "Marseilles soap" added, which "fattens" the metal. Finally, one gram of sodium is added at the moment of casting.

Another and more simple method of making bronze malleable is claimed to have been discovered by M. Dronier; it consists in the addition of from one-half to two per cent. of mercury, and appears to act mechanically rather than chemically. It is added to one of the metals of which the alloy is made.

Electrical Transmission of Power in France.—A satisfactory example of the transmission of water-power by electricity has lately been started near Grenoble. The water is dammed with an effective head of 230 feet, and is conducted by a sheet steel pipe to the turbine. The generating dynamo is coupled directly to the horizontal shaft of the turbine, and is connected to the two cables of an aërial line, through which the power is transmitted to the motor at Montier, a distance of a little more than three miles. The general conditions of working the plant are, according to *Le Génie Civil*, as follows.

Generator	300 horse power,	240 revs. per min.
Motor	200 "	300 " "
Pressure	2,850 volts.	
Current	70 ampères.	
Resistance of line	3·474 ohms.	
" dynamo fields	0·950 "	
" " armatures	0·984 "	
" motor fields	0·731.	
" " armatures	0·690.	
" total of circuit	6·829.	
Electrical efficiency	83 per cent.	
Mechanical	65 "	

Since this plant was started in November of 1889, it has not ceased to work day or night, and although the care of the machines presents some difficulty, no increase whatever of the staff has been required. Four men are employed, two at the generator and two at the motor each being in attendance for twelve hours. A telephone line is run on the same poles as the working line. Shortly after it was started a frost set in, entirely stopping the traffic, and since that time until March 15 the communication by the roads was cut off. The line was struck several times by lightning, but both generator and motor were fully protected. The power is used for driving a paper mill, and the economy is found to be very marked as compared with the cost of fuel.

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent Office:

TUESDAY, AUGUST 12th, 1890.

433,941. Aerial Railway Transmit. Wallace L. Hight, Boston, Mass.
433,951. Compound Steam Air Compressor. Albert P. Massey, Watertown, N. Y., Assignor to the Eames Vacuum Company.
433,992, 433,993, 433,995, 433,996. Steam Pump. Bruno V. Nordberg, Milwaukee, Wis., assignor to the Bruno Nordberg Company, same place.
434,030. Electric Railway. Rudolph M. Hunter, Philadelphia, Pa., Assignor by mesne assignments to the Thomson-Houston Electric Company, Boston, Mass.
434,058. Brick Kiln. Pulaski B. Broughton, Austin, Minn.
434,076. Underground Electric Conduit. Franz G. C. Zopke, Berlin, Germany.
434,092. Furnace for burning hydrocarbon oils. Jacob Schinneller, Pittsburgh, Pa.
434,143. Steam Engine. Darwin E. Crosby, Philadelphia, Pa.
434,171. Gas Engine. Cyrus W. Baldwin, Yonkers, N. Y.
434,184. Furnace for Melting Glass. Luke Houze, Fostoria, Ohio, Assignor of two-thirds to Charles Foster and Leopold Mambourg, same place.
434,204. Metal Screw Machine. Ernestе Rothlisberger, Lima, O.
434,213. Metallic Railroad Tie. Hiram Taylor, Northampton, and Dwight E. Sherman, Springfield, Mass.
434,226, 434,227. Steam Generator. Darwin Almy, Bristol, R. I.
434,278. Hoisting and Transporting Mechanism. William P. Jordan, Washington, D. C.
434,294. Mode of Shaping Cast Steel. John A. Potter, Homestead, Pa.
434,305. Rail Tie. David Vanaman, Birdsborough, Pa. Assignor of one-half to William Vanaman, same place.
434,400. Manufacture of Plate Glass. John T. Pennycook, Newark, N. J., Assignor by direct and mesne assignments to Edward M. McCook, Riverside, Conn.

TUESDAY, AUGUST 19th, 1890.

434,420. Street Railway Track. Charles A. Beach and Robert Dansinger, Albany, N. Y., said Dansinger assignor to said Beach.
434,424. Pipe Threading and Cutting-off Machine. Arthur W Cash, Bridgeport, Conn., Assignor to the Armstrong Manufacturing Company, same place.
434,428. Thermo-Electric Generator. Harry B. Cox, New Haven, Conn., Assignor to the Electric Generator Company, Portland, Me.
434,463. Steam Condenser and Water Heater. Frank Rademacher, Los Angeles, Cal., Assignor of one-half to Hiram H. Eithead, same place.
434,472, 434,473, 434,474, 434,475, 434,476, 434,477, 434,479, 434,480, 434,481, 34,482, 434,483, 434,484. Ball-Bearing. George T. Simonds, Fitchburg, Mass.
434,502. Muffle Furnace for Desulphurizing Ores. George H. Chick, Kansas City, Mo.
434,525. Railway Frog. Nicholas Ratchford and Lewis D. Evans, Plain City, Ohio.
434,530. Process of and Apparatus for Forming and Welding Metals by Electricity. Elihu Thomson, Lynn, Mass., assignor to the Thomson Electric Welding Company, of Maine.
434,542. Metallic Tie and Rail for Railroads. James A. Green, Philadelphia, Pa., Assignor of two thirds to Thomas McDonough and Lewis McDowell, both of same place.
434,561. Steam Engine. Dexter D. Hardy, Lake View, Assignor to the Hardy High Speed Engine Co., Chicago, Ill.
434,579. 434,580, 434,581, 434,582. Apparatus for Tranferring Electric Car Batteries. Frederick G. Corning, New York, N. Y.
434,587. Thermo-Electric Battery. Thomas A Edison, Llewellyn Park, N. J.
434,588. Magnetic Ore-Separator. Thomas A. Edison, Llewellyn Park, and William K. L. Dickson, Chicago, Ill.
434,591. Feed Water, Heater and Purifier. Charles E. Ferreira, Morgan Park, Ill.
434,609. Gas and Hydrocarbon Engine. Adolphus W. Schleicher and Paul A. N. Winand, Philadelphia, Pa.
434,621. Apparatus for Manufacturing Gas. John B. Archer, Washington, D. C.
434,623. Process of Making White Lead. Arthur C. Bradley, Brooklyn, N. Y.
434,631. Rail Joint. Leo Aman, St. Louis, Mo., Assignor of one-half to Thomas F. Hogan, same place.
434,640. Thermal Battery. Hugo Mestern, Munich, Germany.
434,656. Steam Engine. Albert Cunningham, Milwaukee, Wis.
434,666. Water Purifying Apparatus. Omar H. Jewell and William M. Jewell, Chicago, Ill.
434,667. Feed Water. Heater and Purifier. August Krumholz, Chicago, Ill.
434,675. Steam Trap and Separator. John S. McDaniel, Philadelphia, Pa., Assignor to himself and James Watson, same place.
434,677. Riveting Machine. William Pardy, San Francisco, Cal., Executor of George Pardy, deceased.
434,684. 434,685, 434,686, 434,687. Electric Railway System. Charles J. Van Depoele, Lynn, Mass.
434,692. Street Railway Switch. John H. Williams, Boston, Assignor of two-thirds to Benjamin F. Barnard, Wakefield, Mass.
434,693. Belt or apron for ore concentrators. Geo. E. Woodbury, San Francisco, Cal.
434,694. Process of Reducing Iron Ores with Heated Gases. Charles Adams, St. Louis, Mo.
434,715. Hearth Furnace for Metallurgical Operations. Barnard C. Lauth, Philadelphia, Pa.
434,804. Manufacture of Helical Coils of Metallic Tubing. Daniel A. Quiggin, Blundell Sands, near Liverpool, Assignor of one half to John Newton, London, England.
434,827. Electric Railway. Adelos Gorton, Camden, N. J.
434,831. Filter Press. Fritz Kleeman, Schoeningen, Germany.
434,848. Railroad Tie and Support. John E. Taylor, Chester, Pa.

PERSONAL.

Mr. R. A. Jackson is now owner of the Powelton lease, including the old Powelton mines, near Osceola Mills, Pa.

C. McK. Camp, the well-known mining stock broker at the Consolidated Stock and Petroleum Exchange, of this city, has returned from Virginia.

W. M. Cooper, of Allegheny, Pa., left on Aug. 24 for Lordsburg, N. M., to erect a concentrator and matte works for Mr. M. Hulings, which is expected to put into marketable shape the ores of the Southwest.

Mr. M. Dusseldorf has been tendered the general management of the Dickens-Custer Mining Company, Limited, of Idaho. He intends to go to London, for the purpose of consultation as to the future workings of the company's property and its prospects.

OBITUARY.

Orlando W. Atkinson, of the firm of Johnson & Co., iron founders, at Burlington, N. J., died on the 26th inst.

Charles A. Girdler, one of the best known practical mining experts in Arizona, died in Prescott, Ariz., on the 20th inst.

Mr. George W. Tilton, superintendent of motive power and machinery of the Chicago & Northwestern Railroad, died on the 17th inst.

Mr. Burk Tucker, president of the Plume & Atwood Manufacturing Company, of New York, died August 13th. He was born June 19th, 1813.

Charles Dimon, a well-known banker and member of the Consolidated Stock and Petroleum Exchange, died in Brooklyn on the 27th inst. in the sixty-fifth year of his age.

Jack Develing, who was a close friend of Inventor Ericsson, died on the 25th inst. at Jersey City. During the war Mr. Develing was in charge of the Delamater foundry on Ship Island. It is said he cast nearly all the machinery used by Ericsson in building the Monitor. He was about 60 years old.

William H. Dunbar, senior member of the tack manufacturing firm of Dunbar, Hobart & Co., Whitman, Mass., died August 14th, at Santa Barbara, Cal. Mr. Dunbar was seventy-four years old. His business of manufacturing tacks was carried on in works that perhaps are the largest in the world.

The death of Richard D. Atkins, the mining capitalist, is announced. He was well known in all the leading mining camps of the Pacific coast. He mined in Montana 25 years ago and afterward made a fortune in diamonds at Kimberley, Africa. At the time of his death he was a large owner in the Hall Brothers' group of mines in the Kootenai district, and also had other interests in that section. He died in British Columbia.

Sir Warington Smyth, Professor of Mining at the Royal School of Mines, London, died the 19th ult., in the seventy-third year of his age. He was born in Naples; was sent to the English schools; took a prominent position as a scientific authority on mining, and was invariably consulted by the government on mining matters. Among his numerous contributions to geological journals, reports, etc., is a Rudimentary Treatise on Coal and Coal Mining.

Henry Loveridge, the president of the Maryland Coal Company, died on the 22d inst. of heart failure in his 49th year. Mr. Loveridge was born in England in 1841. He came to this country at an early age. In 1873 he became secretary and treasurer of the Maryland Coal Company. In the latter part of the same year he was appointed vice-president of the company, which office he held until 1875, when he was elected president. Mr. Loveridge was well known among railroad men, and it was through his personal efforts that the George's Creek & Cumberland Railroad, a coal line, was started. He was also instrumental in securing the rights for the Pennsylvania Railroad to pass through Maryland.

INDUSTRIAL NOTES.

Mr. Arthur Keen, the Chairman of the Patent Nut & Bolt Company, the founder of the Nut and Bolt Trust, of Birmingham, Eng., will shortly visit this country.

The Chalmers-Spence Company, of 59 and 61 Liberty street, New York, has secured the contract for covering the boilers, steam pipes, cylinders, etc., of the new Fall River palace steamer, "Plymouth," with its patent fire-felt (asbestos) covering.

The blast furnace of the Riverside Iron Works, at Steubenville, Ohio, which is undergoing repairs at present, will be ready about September 15th next. Three new hot blast stoves of the Massicks & Crooke's design are being added to the equipment of the furnace by McClure & Amsler, of Pittsburg.

We have received an interesting little pamphlet from Merchant & Co., which treats of ventilation in all kinds of buildings, railroad cars, vessels, and which shows in detail and by sectional drawings the successful operation of their "Star" ventilator. Messrs. Merchant & Co. have offices in New York, Philadelphia, Chicago, Kansas City, and London.

A fine transit recently purchased from W. & L. E. Gurley, Troy, N. Y., by Prof. Wm. B. Phillips, sustained a severe fall and had to be sent back from Marion, N.C., 30 miles from Asheville, on the W. N. C. Railway, to be repaired. Within nine days the instrument was overhauled, fitted with stadia wires and received back at Marion. Such prompt attention to business merits high praise.

The Connecticut Motor Company, of Plantsville, Conn., is now issuing an instructive monograph on the use of electric motors, power generators and incandescent dynamos. The pamphlet, which is liberally illustrated, treats in detail of the manifold purposes to which the electric motor is being applied, besides a table of electric traction calculations, prepared expressly by Mr. A. T. Snell.

The new basic open-hearth plant of Carnegie, Phipps & Co., at Homestead, Pa., contains some interesting features. It consists of eight 15-ton furnaces in two rows of four. Along each group runs a track to the circular casting pit at one end of the building. There the casting ladle is lifted off the carriage, and is emptied into the molds placed in the circular pit.

The launching of the first steel vessel ever constructed in New Jersey took place at Elizabethport on the 28th inst. Samuel L. Moore & Sons are the builders. The steamer is built for residents of Mexico. The dimensions of the craft are 65 feet long, 15 feet beam and 6½ feet hold, or about one-third the size of the practice cruiser which the firm is to build for the United States Government.

It is reported that the erection of an open hearth steel plant and a bridge shop is contemplated in the near future by the Muskegon Iron and Steel Company, of Muskegon, Mich. The company is now completing its rolling mill, which will start with one 18-inch and one 9-inch 3 high train of rolls. Merchant bar iron and steel and copper rods will be made. S. T. Williams, formerly of the Standard Iron Company of Bridgeport, Ohio, is president of the company.

The new hopper dredger "Manchester," recently launched from the yard of Messrs William Simons & Co., Renfrew, has a capacity in its own hopper for 900 tons of dredgings, and when tried off Greenock dredging clay she loaded at the rate of 1,000 tons per hour; afterwards she proceeded to Wemyss Bay, where the measured mile was run at the rate of nine knots per hour. In a few days the "Manchester" will leave the Clyde for the Mersey, to commence work at entrance to the new canal.

About a month ago the extensive plant of Brown, Bonnell & Co., at Youngstown, O., was sold to a syndicate of creditors for $700,000 at the instance of the Lake Superior Iron Company. Suit has now been brought by the stockholders of Brown, Bonnell & Co. to have the sale set aside. Fayette Brown, receiver for the firm, filed his report for July on Saturday, the 23d inst. It showed that the amount of cash on hand on July 1st was $2,220.59; receipts for July, $173,426.05; disbursements, $103,552.56.

United States Consul Charles Denby, writing from Peking, China, makes an interesting statement regarding telegraphs in China. In it is shown the fact that but four Chinese provinces, Shansi, Shensi, Kansu and Hunan, are without telegraphs. One hundred and fifty-seven telegraph stations are named, and the various tariffs stated. These range from 10 cents to 38 cents a word to and from Peking, according to distance. Several new telegraph lines have been projected, and work is progressing on others. It is evident that the Mongolian prejudice against western institutions has been largely overcome.

A shortage of natural gas more general than any previous shortage is announced among the iron works at Pittsburg, Pa. At Jones & Laughlin's American Iron Works the men are not making full time owing to this shortage. David B. Oliver did not advance any theory as to the cause, but even in his company's own mill a sufficient supply was not to be had, and this notwithstanding the fact that they drew their supply from their own wells.

The new plant of the Tyler Tube and Pipe Company, which was recently removed from Boston to Washington, Pa., is about completed. The rolling mill contains an 18-inch three high train of rolls, and is run by a Corliss engine of 300 horse power. The mill building is 160 × 80 feet. The tube mill is in a building 250 × 80 feet, and contains a modern gas regenerative furnace. The officers of the company are as follows: W. P. Tyler, president; Walter Woodman, treasurer, Edward Woodman, Calvin P. Sampson, W. P. Tyler, J. W. Mitchell, W. L. McCleary, and J. H. Ellsworth, directors.

The Western Light and Power Company, of Chicago, have given Magnolia metal a trial with satisfactory results. The manager writes: Some months since we had a great deal of difficulty with our Ball engine running with bearings hot, and used a great deal of oil without causing the bearings to become any cooler. The Ball engine is 100 H. P., 14 inches by 13 inches, 270 revolutions per minute, and carries 90 pounds steam pressure. Bearings, 4 inches and ⅞ inch diameter, by 4 inches length. There is but about ½ inch play allowed in the bearings, and makes a very close fit. We have had the most excellent results from the use of magnolia metal, and could not ask for better service.

An opinion was filed in the United States Circuit Court, at Pittsburg, Pa., on the 28th ult., in the case of George Westinghouse, Jr., vs. the Chartiers Valley Gas Company, in which the plaintiff claims that the patent relating to pipe-joints and lines for conducting liquids and gases had been infringed upon by the defendant. The patent in question was dated July 13, 1886, and was granted to George Westinghouse, Jr., assignee of Morris S. Verner. Judge Acheson states that in his judgment the device used by the defendant company does not infringe upon the patent in suit, and that the claims of the patent are destitute of patentable novelty, and therefore dismisses the bill of complaint. The joint did not differ from any pipe joint. Hereafter the patent is not in force and any one can use it.

It is only about two years since the attention of mine operators was first called to the practicability of electric transmission of power and the great advantage of substituting by this means water for steam power where this could be had within any reasonable distance. Few of our readers are perhaps aware of the interest that has been awakened in this subject, and the rapid progress made in its development. One of the more recent undertakings of this character is that of the Caroline Mining Company, of Ouray, Colo. This plant, now in course of construction, consists of two Pelton wheels of capacity of 400 horse power, to run under 525 feet head, and are to operate United Edison dynamos, the power of which is to be transmitted three and a half miles to the mine through two strands of 00 wire ground return. The machinery to be operated consists of a Knowles pump with a 730 foot lift, 30 horse power hoist, 100 ton concentrating mill, as well as a saw mill. The Aspen Mining Company, of Aspen, Colo., have also an electric transmission plant consisting of four Pelton wheels running under 50-foot head, with a capacity of 200 horse power, the power from which is transmitted some three miles by Thomson-Houston generators running a pump, hoist, tramway, etc. This plant has been in operation for some three months and is reported as every way satisfactory.

(From our Special Correspondent.)

The Ocmulgee Land Improvement Company has employed Mr. B. S. Church, an expert hydraulic engineer, to investigate and report on the feasibility and practicability of a canal to be built from its property on the Ocmulgee River to the city of Macon, Ga. Should this canal be built, it will be the greatest improvement that has been made in that part of the State; the purpose is to furnish the city with water power for all manufacturing purposes, and many of the largest enterprises have already expressed their intention of taking advantage of it. Every one that has investigated the subject is confident of success, and this seems to be substantiated by the fact that there is no difficulty in placing the stock.

The capital stock of the company is $1,000,000. The officers are: J. C. McBurney, President; J. S. Baxter, Vice-President; H. G. Cutter, Secretary and Treasurer.

A corps of engineers are now at work on the survey, and the result will be watched with great interest, as it is estimated that the success of this enterprise will furnish power at very low cost, and therefore will invite more manufactories, shops, etc., to locate in the city.

Application has been made for a charter for the Georgia Rolling Company, asking that it be incorporated with a capital of $250,000, and the privilege of increasing it to $1,000,000. The incorporators are H. J. Lamar, Sr., John S. Schofield, J. W. Cabaniss, Thomas W. Troy and John S. Baxter. It is proposed to establish a large car works in the city of Macon, Georgia.

SOUTH CHICAGO.

(From our Special Correspondent).

The map of Chicago stretches now in a circle 35 miles from the center of the city, and we must look close to the outer edge to locate many of the recent sales that are recognized as "suburban acres."

Southward we find clustering around the mouth of the Calumet River at South Chicago new enterprises under way that will employ 10,000 additional men, which means 50,000 people added to the population in this small area alone. New life in the form of millions of capital and a score of new manufacturing enterprises is being infused into the South Chicago district.

The Illinois Steel Company of to-day is so far ahead of the enterprise of a year ago, in amount of product, men employed, and capital invested, that it can almost be called a new industry. The

plant covers a tract of over 250 acres on the lake shore north of the mouth of the Calumet River, and of this tract one-half has been bought and improved during the past year.

It would seem to be a matter of self-preservation for outside manufacturers to obtain a foothold in Cook county. Rivals or new concerns may do so, and, by coming closer to the better railroad facilities, obtain over others powerful advantages. So it is we have the towns of South Chicago, Cicero, Harvey and the Calumet region dotted with factories proposed and under construction.

The Cheltenham Beach property, comprising eighty acres lying just north from South Chicago, has recently changed hands; consideration about $1,000,000. This section is also fast developing into a manufacturing district.

Another new iron industry is now establishing itself on the east side of the Calumet river, nearer its mouth, to be known as the Iroquois Furnace Company. This company will employ about 1,000 men, it is said, as soon as its plant is completed. It has already expended $100,000 for a site, and proposes to expend a similar amount on buildings.

An Eastern syndicate representing English capital is said to be negotiating with the South Chicago Dock Company. If successful this syndicate will expend $2,000,000 in elevators and warehouses in the immediate future, so making this a general distributing point of lake traffic.

The Kalamazoo Spring Company, a company from Oshkosh, Wis., for the manufacture of locks, also a company for the manufacture of wind engines, are seeking sites at the new manufacturing town of Harvey.

The American Fire-proof Steel Car Company will locate in the town of Bloom, near the Indiana line.

CONTRACTING NOTES.

Davis & Rohlston, at Middlesborough, Ky., have given a contract to Fred Wagner, Fort Payne, Ala., to build 300 coke ovens at Middlesborough.

The Phœnixville Iron Company, of Pennsylvania, have been awarded the contract for the iron and steel work of the Crocker Building, at San Francisco, which will cost $1,250,000, and be one of the largest structures in California. The Phœnixville Iron Company also has the contract for all the iron and steel for the Washington Loan and Trust Company Building, at Washington, D. C. It will be ten stories high and a very large edifice.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office.

No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning American goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

These services are rendered gratuitously in the interest of the subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GOODS WANTED AT HOME.

1,036. Best and latest improved machinery for mining quartz. North Carolina.

1,037. Planer, matcher and moulder combined. Georgia.

1,038. A steam drill punch, a steam shear to cut iron 1½ inches thick, and a steam iron table saw; want no catalogues unless parties write us best discounts from catalogue prices. Georgia.

1,039. A 50 to 80 H. P. engine and 60 to 80 H. P. boiler. West Virginia.

1,040. A water motor 10 H. P. or more. West Virginia.

1,041. Machinery for fertilizer and phosphate factory. Florida.

1,042. Two 30-ton ice-making machines for a brewery. Tennessee.

1,043. A 40 H. P. engine and a 56 H. P. boiler. New York.

1,044. One dozen Eastman globe fuel and kindlers. New York.

1,045. A combination dimension and flooring machine, a resaw, ripsaw and molding machine. Louisiana.

1,046. Street car rails and street cars; also dummy engine. Mississippi.

1,047. Complete equipment for foundry. Georgia.

1,048. Complete set of tools for machine shop. Georgia.

1,049. Engine and boiler for machine shop. Georgia.

1,050. An engine lathe, 15 or 16-inch swing. North Carolina.

1,051. A combined steam engine and boiler 2 to 5 H. P. North Carolina.

1,052. Complete outfit for making brick, 15,000 to 20,000 a day—engine, brick machine, etc. Louisiana.

1,053. Drainage pipe. Texas.

1,054. Machinery for a large stove foundry. Tennessee.

1,055. 1,000 tons of Nova Scotia land plaster. North Carolina.

1,056. An engine about 4 H. P., an upright boiler, a pump for hydraulic mining and a lot of hose and a nozzle. Missouri.

AMERICAN GOODS WANTED ABROAD.

1,008. Prices and particulars of a plant for a meat canning factory. Canada.

1,009. Prices and particulars of a plant for a beet sugar factory. Canada.

1,010. Prices and particulars of a plant for a tannery. Canada.

1,034. Agencies wanted of American goods. Australia.

1,057. Information concerning improved rice mills, such as "Brotherhood" patent iron pastles and "Engelbrecht" patent rice cleaner. Peru.

1,058. A ten-stamp gold mill with Frue Vanner concentrators, necessary engine and boiler. Blake's or Marsden's rock breaker, ore feeders, diamond core drill for prospecting, etc., complete; also the equivalent of the above with Huntington Mill in place of stamps. Chlorination plant for the foregoing with Buckner's roasting furnace. China.

GENERAL MINING NEWS.

Shipments of iron ore from the mines of the districts mentioned below for the season up to and including August 20th were as follows:

			Tons. 1890.	Tons. 1889.
Marquette,	Marquette	District	802,350	894,530
St. Ignace,	"	"	15,911	28,304
Gladstone,	Marquette	District	6,183	10,366
"	Menominee	"	35,705	16,195
Escanaba,	Marquette	"	791,908	588,446
"	Menominee	"	1,211,326	996,172
"	Gogebic	"	173,502	175,228
Ashland,	"	"	1,272,828	913,606
Two Harbors'	Vermillion	District	510,727	545,512
Total, tons			4,820,440	4,168,359

ALABAMA.

(From our Special Correspondent.)

BLOUNT COUNTY.

WORTHINGTON.—These mines were idle at last reports, as 300 miners had struck, owing to a reduction of wages for mining coal.

JEFFERSON COUNTY.

VANDERBILT IRON AND STEEL COMPANY.—The first of the 100-ton blast furnaces built by this company has gone into blast, and a second one is under way. George O. Vanderbilt, of New Jersey, is the president of the company. Eastern and foreign capitalists own the stock.

ARKANSAS.

MARION COUNTY.

(From our Special Correspondent.)

This mining region continues to attract attention. Many visitors have been over the zinc prospects examining the workings and seeing the ore taken out every day. New operations have begun on Sugar Loaf during the past week, developing the zinc and lead of the Sugar Loaf mining district. J. W. Brady & Bro. are continuing down on their shaft, showing up good ore. Joe Lemen has uncovered a ledge of zinc ore above the Cincinnati, and takes out the same kind of ore as that found in the Beaty mine—ruby variety of zinc blende. This indicates the probability of finding this kind of ore within an area of five miles. Four miles beyond on the same line is the Bull Shoal Mountain with a big outcrop, showing marionite and the black porous blende. Dysart is finding good blende on the Ike Pangle property which he bought. I. M. Hamilton and others are prospecting their claims with good indications.

The Ben Lawson place was sold to the Missouri & North Arkansas Mining Company. Noah Schoonover brought in 4,000 pounds of flour for the Rush Creek Mining Camp. He used three yoke of oxen and got $50 for the trip from West Plains to Rush. This part of the mining region will open up before long. A railroad extension is taking shape at St. Louis, which means business. Schermerhorn and Professor D. Aailly, of Little Rock, were on a business trip from Harrison the past week buying mining property. Little Rock has an eye on this mining camp and means to secure some of the benefits.

COLORADO.

HINSDALE COUNTY.

(From our Special Correspondent.)

All interest around Lake City at present is centered in the wonderful strikes recently made in the Carmi, the new find of tellurium ore in Alpine, and the promising development of Carson Camp mines, and prospectors are constantly arriving from other parts of the State to examine the territory adjacent to the new discoveries. There is no doubt that the Carmi and Alpine mineral is very rich, and as work progresses the quantity and condition of the ore improve.

The strike made the past week on the west slope of Red Mountain by Pennoyer, Anderson & Co., a party of Ouray prospectors, is believed to be in the same telluride belt as the mineral veins of the east slope of Hotchkiss Mountain, in fact, the eastern spur of Red Mountain. The character of ore is similar (see below), showing more or less tellurium, and the Alpine mineral is also found in lumps and nuggets embedded in the talc veins. No assays have been made, but in some of the pieces reduced to a forge the spar and tellurium were reduced to a slag, leaving the specimens more than half covered with buttons and wires of free gold. The finds are certainly immense, especially when it is considered that they are on the surface. In fact, the development in all parts of the camp promises to show Hinsdale County a wonderful ore producer within a few years.

CARMI.—This is a new location made by J. C. Bothwell only last spring on the east slope of the Hotchkiss Mountain and on the same belt as the old Hotchkiss, the mine that made the Lake Fork famous. Soon after discovering it Mr. Bothwell transferred the property under lease and bond to E. E. Wann, of the local sampling works, and Chas. Davis. The lessees only began steady work some ten weeks ago, and cannot be said yet to have more than surface development. The shaft is down but 15 feet, but in the bottom is a ten-inch pay streak of mineralized talc from which is being taken perhaps the richest ore thus far found in San Juan.

The mineral is a combination of tellurides and silver *glance* and occurs in lumps of various sizes in the talc. This talc, white and apparently worthless, carries from $150 to $450 gold, and from $60 to $200 silver per ton, while the pure metallic ore, which was not found until within the last three feet of sinking, with some spar attached, in two assays gave respective returns of 42 and 60 per cent. in silver and has not yet been tried for gold. The ore will undoubtedly prove high in the latter metal, for some of the specimens show tellurium in combination with free gold. Two tons have been shipped which more than paid expenses of the lease thus far, and there are over three tons now sacked on the dump, besides some 20 pounds of the metal lumps which Mr. Davis took out himself in half an hour's work. The latter are worth over $5 per pound, and the assayer who worked the metal says that, cleaned of spar and talc, it will show 85 per cent. gold and silver.

GOLD LINK.—Another splendid ore streak has just been opened in a parallel adjoining claim located less than a year ago, owned by Geo. Wilson. Mr. Wilson began work a few days ago, and already has out a fine lot of mineral, specimens shown to the writer carrying over 60 per cent. of petzite and sylvanite, and running from $3,000 to $8,000 per ton. The owner will at once begin extensive work, and, as he is also part owner of the Golden Fleece (formerly the Hotchkiss), will probably operate the two in connection. There are also rumors of other important finds on both Hotchkiss and Round Head mountains within the past week that are considered very valuable, but no definite returns have yet been received.

LAKE COUNTY.

DUNKIN MINING COMPANY.—It is reported that the net earnings of the Dunkin mine for the month ended August 16th were $3,645.50. This money is to be used to further develop the new property recently purchased at Breckenridge.

GEORGIA.

(From our Special Correspondent.)

LUMPKIN COUNTY.

HAND GOLD MINING COMPANY.—Captain H. G. Ingersoll, manager, invites prices on concentrators. The concentrates from all the properties under his management are well known to be rich; but the JOURNAL correspondent was hardly prepared to believe all that was claimed for them until upon a recent visit he took a sample himself, and it gave him an assay of $203.43 per ton of 2,000 pounds. This was taken from the famous Barlow cut; there is hardly any doubt that the mills will be supplied with concentrators, and a reduction plant erected, as the progressive manager is heartily in favor of it. I estimate that the ore that was going through the Barlow mill when I was there would yield from one to three per cent. of concentrates, which would yield about 25 tons of concentrates per month, worth the sum of $5,000, all of which is and has been going off down the creek into which the mill tails. And this could be saved and treated at the nominal cost of less than $5 per ton, which can be seen by reference to the recent article in the ENGINEERING AND MINING JOURNAL on the cost of production at the Haile gold mine in South Carolina. Almost the same may be said of the other mills of the Hand Company.

KANSAS.

CHEROKEE COUNTY.

A special report shows that during the week ending August 23d the output of ore from the mining district of Galena and Empire City was: Rough ore, pounds milled, 1,515,170; zinc ore,

pounds sold, 675,000; lead ore, pounds sold, 95,500. Sales aggregated, total value, $9,462.50. Total value of output, $10,806.

MISSOURI.

JASPER COUNTY.

(From our Special Correspondent.)

JOPLIN, Aug. 25.

The zinc ore market has remained the same as last week. The price of lead, however, has advanced to $26.50 per thousand, with a demand for all that can be produced. Some parties are here investigating the smelting scheme. The following are the sales of ores from the different camps:

Joplin Mines, 1,493,040 pounds zinc ore and 181,800 lead; value, $22,113.

Webb City Mines, 967,980 pounds zinc ore and 73,950 lead; value, $13,618.36.

Centerville Mines, 687,850 pounds zinc ore and 100,300 lead; value, $9,981.03.

Zincite Mines, 127,870 pounds zinc ore and 4,010 lead; value $1.693.95.

Lehigh Mines, 22,000 pounds zinc ore; value, $275.

Galena, Kans., Mines, 621,570 pounds zinc ore and 95,440 lead; value, $8,640.

All districts, total value, $56,321.34.

Prof. Gilbert Van Ingen, of the United States Geological Survey, and Prof. Shepard and J. D. Robertson, of the State geological staff, arrived in Joplin Friday evening from Seneca, making some investigation of the chert beds along Shoal Creek. From here they went to Galena, Kans. Prof. Shepard showed your correspondent many interesting things from field notes in reference to the lead and zinc deposits and the formations in which they were found in the above-named counties.

The most important strike of the week was made Friday on a new tract of land three miles due east of Joplin by opening up a large body of lead at a depth of 16 feet. This tract of land, 40 acres large, was recently purchased for $6,000 by Kansas City and Fort Worth parties, who immediately commenced development.

Mr. Henry B. Paine, the promoter of the 1,000-acre land and zinc company, was in Joplin during the week, looking after his many mining interests. He says that the treasury stock of the 1,000-acre company is being rapidly subscribed for. This tract of land, one solid body, one and one-half miles southeast of the city of Joplin, is almost surrounded by producing mines; it has always been looked upon as a valuable tract of mineral land, and, as we are informed, development will soon be commenced in a thorough and systematic manner, which will prove up the lead and zinc ore bodies. The present officers of the company are some of Kansas City's best business men.

Judge Hilton has sold his mining interests, embracing four mining lots on the Oswego Mining Company land, to Kansas City parties. The lots are quite well developed and in ore.

The Joplin electric street railway enterprise is being pushed with a vim that means business, and the officials promise that it will be completed within sixty days.

The Southwestern Electric Power Company has just completed its new pole line from Grand Falls to Joplin, a distance of five miles. The contractors who are building the new dam at the falls are completing the work so fast that in a short time the mines can be operated by electric power.

CENTER CREEK.—The increase in the capital stock of this mining company in Webb City from $1,000,000 to $1,500,000 last week is an illustration of the rapid increase in mining properties of this lead and zinc district.

This company was one of the oldest-organized companies in the Southwest, and controlled a lease on 160 acres of the Webb estate, on which lead ore was first discovered by plowing a cornfield; prospectors soon learned the fact of the discovery, and lead was found in large quantities almost under the surface soil. About this time the Center Creek Mining Company was organized. A reorganization was made in 1885, when Mr. J. C. Stewart became the principal owner, his brother, W. C. Stewart, and one or two others holding some stock. From this date the company made rapid progress, and acquired in 1888 control of what has since proved the almost phenomenal Sucker Flat mines. In the spring of 1889 it passed through another reorganization, Mr. J. C. Stewart disposing of one-half the stock, and it became the Center Creek Mining Company, with a paid up capital stock of $1,000,000. The Sucker Flat mines by this time had become great producers of zinc ore. The company now controls its original lease on the 160 acres, owns 40 acres adjoining on the northeast, ten town lots and a third interest in 36 town lots on which it has a lease; these town lots are locally known as Sucker Flats. The present officers are: B. F. Hammett, president; J. C. Stewart, vice-president; L. E. Davidson, secretary, and W. C. Stewart, assistant secretary. This same company also controls and operates the Exchange Bank, of Webb City.

The system of pumping and drainage of the mines is the best in the entire mining district; their central power plant is supplied with two powerful engines and a battery of boilers so that in case one engine requires to be closed down for repairs the other is ready to drive the pump. The company has now in operation on the old Webb farm over 2,000 feet of connections from the central power plant to drive the pumps located at the different pump shafts. The stockholders draw regular dividends of not less than 20 per cent. on their investment.

SHOAL RIVER.—This mining company, composed of 20 business men, of Joplin, has leased 40 acres from Dr. Owen, southwest of the city and will commence development the present week.

NEW MEXICO.

(From our Special Correspondent.)

SILVER CITY, Aug. 25.

The outlook for mining and miners is much improved in this section, owing to the increase in the value of silver. Most of the ore is of a comparatively low grade, and heretofore, owing to the cost of transportation, much of the ore has gone on the dump, the ore not paying the cost of mining and shipping. Milling the silver ores here is out of the question, as water is scarce, and the only silver mines which can be worked are those containing rich pockets.

What we need is another railroad starting from Albuquerque and passing through the southwestern portion of the territory, which would open up a rich country and reduce the rates to the points where the smelters are located.

A very rich strike has been made at Lone Mountain recently. Lone Mountain is an old camp nearly deserted for some time but the recent strike has given it new life. The find is on a contact vein, which, at the depth of about 22 feet, shows a 5-foot breast of ore which is very rich; the last carload shipped to Denver yielded $8,000. There are many other good properties at Lone Mountain, but none quite so extensive as the recent find. What Lone Mountain needs is a mill, it being the best-watered camp in the country, and having plenty of 30-ounce ore, which could be milled at a profit.

Pinos Altos gold camp has had some very heavy rains lately, and now the mills which have been idle for so long are running, putting new life into the camp. The road from Silver Creek to this place, built by subscription, is nearly completed and the mine owners at Silver Creek will soon begin the erection of mills at that camp, which will make it one of the best camps in the country. The ore bodies at Silver Creek are large and free milling; water is abundant, and if the ore will average as well as is claimed for it, Silver Creek is a promising camp.

Kingston is quite lively at present. An Eastern company has purchased some of the best properties and are working quite a number of men. At Lake Valley the mines are all being operated under leases, and some of the leasers make fortunes in a single month. All the camps in the southern part of the county are feeling the rise in silver, and old shafts are being cleaned out and put in shape.

The main trouble here is the sending of inexperienced men out as mine superintendents, wasting the money of the people they represent.

Gold Hill has a new mill and plenty of ore to run on, and now will begin to be a producing camp; the ore bodies are large and of a fair grade.

All in all the outlook at present for mining in this section is better than it has been for several years and the mining men are in better spirits and more confident of the development of the country.

NORTH CAROLINA.

(From our Special Correspondent.)

In the United States Circuit Court at Baltimore, Md., R. B. Tippitt, attorney for Salisbury & Kidd, A. Hoen & Co., and others, recently filed a bill in equity against the directors of the Consolidated Land, Lumber and Transportation Company, of North Carolina.

The bill asks for the appointment of a receiver for the company and for an injunction on the ground that the concern is insolvent. The claim is made that there has been no meeting of the board of directors for more than a year; that at the last meeting George B. Morton was deposed as president, and that his successor has never been appointed. The aggregate claims of the plaintiffs amount to $4,030. The company owns 73,600 acres of timber and mineral lands in North Carolina; it was incorporated in 1887.

The Mercantile Trust and Deposit Company, of Baltimore, is also made a defendant because of the insurance of a mortgage by the company to it to secure bonds to the amount of $25,000.

ROCKINGHAM COUNTY.

Some local excitement has been raised in this county by the supposed discovery of veins of silver ore on the land of a Mr. Baughn, near Price's Store. It is said to have been discovered by the contractors of the Roanoke & Southern Railroad and negotiations have commenced for the purchase and subsequent development of the property.

PENNSYLVANIA.

COAL.

MARYLAND CENTRAL RAILROAD COMPANY.—A dispatch from Baltimore says that this company has in contemplation a scheme to penetrate the anthracite coal regions, either by extensions of its own or by traffic arrangements over existing lines. The road now has an outlet to York over the York & Peach Bottom road, which it has absorbed. The Western Maryland's tidewater extension and its interest in the proposed Potomac Valley will bring additional trade to Baltimore. The Western Maryland proposes to make connection with the Reading road.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to August 22d, were as follows:

	1890. Gals.	1889. Gals.
From Boston	1,969,733	3,075,357
Philadelphia	95,935,182	92,367,170
Baltimore	7,911,360	3,592,275
Perth Amboy	9,167,386	12,280,066
New York	268,481,964	278,015,089
Total	383,465,625	389,329,957

SOUTH CAROLINA.

(From our Special Correspondent.)

LANCASTER COUNTY.

HAILE GOLD MINE.—Captain Thies, manager, says with considerable satisfaction that everything is now in perfect running order, and that all the damage caused by the recent fire has been repaired. It is his purpose to write up the chlorination process for the transactions of the American Institute of Mining Engineers, and it will probably be contributed at the fall meeting. This will be a valuable article, as it will give the latest and very successful practice at Haile, especially as regards the furnace work.

YORK COUNTY.

YORK GRANITE COMPANY.—This company, of Yorkville, has been incorporated with a capital stock of $50,000. The purpose of the company is to develop the Whiteside granite quarries, embracing about 1,100 acres of land.

SOUTH DAKOTA.

PENNINGTON COUNTY.

(From our Special Correspondent.)

In the summer and fall of 1876 the locations known as the Blue Wing, Grey Eagle and Strater, on the Blue Lead Hill, were made near Sheridan, one of the oldest towns in this county. These were the first discoveries of copper ore in the Black Hills, and are the only locations to-day on which any great amount of development work has been done. I recently visited these mines, all of which are located in the same mountain.

BLUE WING.—The workings on this property consist of two tunnels run into the hill, somewhat lower than the mouth of the shaft of the Strater; each is about 40 feet in length, and although running through ledge matter no well-defined wall has yet been disclosed. The same character of cinder is seen in these tunnels in chutes dividing the ledge matter, while the formation apparently dips towards the east. This property was worked for a while quite extensively in 1886 and a small smelter erected in the gulch about a half mile from the north end line of the Strater, and some work done on an ore road between the Strater dump and the smelter, but no ore was treated. Various reasons are given for abandoning the work at that time, and since then but little attention has been directed toward this Blue Lead Hill until recently. It is now proposed by a party of capitalists to prospect these locations with a diamond drill. Starting on the west side of the hill at a point somewhat below the tunnels on the Blue Wing, this syndicate proposes boring to the depth of 1,100 feet at an angle of about 45 degrees, thereby expecting to cross-cut the vein and ascertain its width and richness. The machinery is already on the ground, and will be in operation in a few days.

GREY EAGLE.—In this, the oldest, location the side lines follow the summit of the mountain from northwest to southeast, which is within the boundary lines of the claim, and on the extreme apex are located the workings, consisting of a shaft 120 feet deep, at the bottom of which is a drift 35 feet long in a westerly direction. On the dump there is now about 350 tons of copper ore, which was taken from the shaft and drift. The results of assays show the ore to carry about 20 per cent. copper, and this is a conservative average. The ore was encountered from the surface down, and the formation, although only the hanging wall has yet been discovered, will warrant the assertion that there is a true fissure vein of unknown width at present. In sinking through the copper-stained gossan ore a leached, decomposed bed of ash and cinder was encountered, and no one has yet gone below this.

On this Strater location a shaft 89 feet has been sunk, and a drift running eastward 35 feet from the bottom of the shaft. The boundary lines of this location are parallel to those of the Grey Eagle joining that claim on the west, while the Blue Wing location is an extension of the Strater in a southerly direction, its boundary lines being also parallel to those of the Grey Eagle; the shaft on the summit of the hill being about the centre of the Grey Eagle, bringing it about in line with the end line dividing the Strater and Blue Wing. On the Strater dump there are about two hundred tons of ore of a different character from that on the dump of the Grey Eagle, the ore from the Strater carrying both silver and gold, as well as copper. These workings are about two hundred feet below the summit of the hill. In sinking, only the ash bed, without the cinder, was en

countered, together with strata of red clay and quartz rock carrying gold.

TENNESSEE.

(From our Special Correspondent.)

STEWART COUNTY.

CUMBERLAND IRON WORKS.—This company is reported as having sold out to an English syndicate, stocked at $1,250,000, and is to be known hereafter as the Cumberland Lands, Limited. Extensive operations are soon to commence, furnaces built, mills erected, etc.

VIRGINIA.

SPOTTSYLVANIA COUNTY.

(From our Special Correspondent.)

WHITEHALL GOLD MINE.—Captain James R. Archer, managing superintendent, has recently purchased 20 stamps and the accompanying machinery necessary for a 20-stamp mill, also a Golden Gate concentrator, from the Genesse Gold Mining Company, of North Carolina. He will purchase the power at once and erect a first-class mill. It is expected that he will meet with success, as the property has a good reputation. It is an extension of the Rappahannock mine.

FOREIGN MINING NEWS.

BRITISH COLUMBIA.

(From our Special Correspondent.)

NELSON, Aug. 18.

An important proclamation has recently been issued by the government to the effect that "all alienation of any and all crown lands by private sale will be discontinued from and after this date (July 31st)until further notice,pending contemplated legislation." In other words, the public land is reserved for actual settlers under the pre-emption and homestead acts. Previously speculators and land grabbers could purchase outright as much land as they pleased by giving 60 days' notice of their intention and paying $2.50 per acre.

The Columbia and Kootenay Steam Navigation Company now run their steamer from Revelstoke to Little Dalles, in Washington Territory, where connection is made with the Spokane & Northern Railway, now completed to this point. This arrangement does away with the use of the trail from Colville to Sproat.

HOT SPRINGS DISTRICT.

COLUMBIA.—The most promising of this company's claims is the Black Chief, and a tunnel is being run from near Krao Creek to tap this ledge. The country rock is limestone and the general run of ore—which consists of coarse-grained galena and carbonates—is N. 25° W. or about transverse to the strike of the rocks. The vein dips S. 76° W. at an angle of about 22 degrees. The clean ore carries 50 ounces of silver to the ton.

EMPIRE CONSOLIDATED.—This, another Spokane Falls company, is doing development work on its claims, the Thanatopsis, Union, Dictator, and Orinoco. The Union was sunk last fall to a depth of 85 feet, at which point surface disturbances were still apparent. The ore consists of fair-grade galena and carbonates.

FOURTH.—The continuity of this ledge, discovered only six weeks ago, has been proved by open cuts for 600 feet. The clean ore assays from 394 to 550 ounces in silver per ton.

GOAT RIVER.—Some high-grade galena and carbonate ore (assay values known but not yet available for publication) has lately been discovered near the south end of the Kootanie lake and claims have been staked about three miles northeast of the mouth of the Goat river. The place is 50 miles south of Hot Springs Camp.

REVELSTOKE.—Mr. J. Campbell, the manager of this company, passed through Nelson on his return from Spokane Falls, where he purchased 500 tons of Alaska ore for the smelter at Revelstoke. He stated that the railway company has arranged to have the track from Sproat to Nelson within one and one half miles of Nelson, by November, and thus available for shipping the ore which they are taking out of the "United" in large quantities. As many men as can be worked to advantage will be put on at the "Number One" claim immediately.

SKYLINE.—Work has been commenced on the new vertical shaft, about 200 feet west of the old one, which will strike the ledge at a depth of about 320 feet; ore running up in the hundreds is also being taken out of the old stopes. The ore body occurs between argillites and limestone, the latter forming the foot-wall. It lies, however, only 300 feet east of the granite region which extends westward with very few breaks to the Columbia River, and it is quite possible that, at a greater depth than has yet been attained, the ledge may reach the granite and become a contact between the granite and the limestone and schists.

NELSON DISTRICT.

KOOTANIE BONANZA MINING COMPANY.—Mr. R. D. Atkins, who recently became a part owner and manager of the property of this company, died at Nelson yesterday.

NEVADA.—The ledge on this claim has been struck after running the tunnel 30 feet. The vein is four feet wide and the ore resembles that found on the "Poorman" and "Royal Canadian;" viz., milky quartz carrying free gold and iron pyrites. The assay value of the new ledge is not yet known, but the Royal Canadian has ore running from $70 to $700 per ton while the whole of the Poorman ore mills from $30 to $40 per ton. Fine quartz, carrying much free gold, has also been obtained on the Little Diamond mine, a vein occurring, like the Nevada, in grey mica-syenite between Eagle and Forty-nine creeks.

TOUGHNUT.—The ore from this claim, which formerly carried a large percentage of zinc, is now changing to clean, coarse-cubed galena, assaying well.

TRAIL CREEK.—The excitement over this new district, on the Columbia river, is increasing. Over 60 miners are at work on the ground. On the hanging wall of several of the ledges, soft decomposed rock, very high in free gold, has been discovered. A large sample of ore from the "Jose" claim, three feet below surface, carried $79 in gold, 8 4-10 ounces in silver, and 10·66 per cent. copper. The ore formerly discovered was refractory in character, but galena ore—easily concentrating to $65 per ton in silver and by no means refractory—was unearthed last week; many of the shafts are altogether in ore. A town is springing up near the claims and has been named Robson, after the Premier of British Columbia.

UMATILLA, APEX, UNCLE SAM AND LIZZIE C.—These are the most important of a group of claims situated on the east side of Cottonwood-Smith Creek, about 2½ miles from Nelson. The veins on the Umatilla, Uncle Sam and Lizzie C. run nearly northwest and southeast, are traceable for a considerable distance and vary from 2 to 8 feet in width. The vein matter consists of hard vitreous quartz carrying fine-grained galena, blende and tetrahedrite. On the foot wall the ore blends irregularly with the diabase, but the hanging wall (on the Umatilla and Uncle Sam) is formed by an intrusive mass of gray granite. The assay value of the ore is $40 to $45 in silver, and the ore can be easily concentrated. The shaft on the Umatilla is down 40 feet and a tunnel is being run on the Lizzie C. to tap the ledge at a depth of over 100 feet.

CHINA.

An Associated Press dispatch from Chicago, Ill., says that several Chinamen have succeeded in obtaining the consent of the Royal Viceroy to establish a stamp and quartz mill in Sang Tong, Chicago, it is claimed, will supply $130,000 worth of machinery for the enterprise, the first of its character in the Celestial Empire. Tong Sing Kow and Tom Pink Chew have been in Chicago for some time completing arrangements for the transportation of the machinery. Mr. Kow will take with him a Chicago engineer to superintend the works. It was known, so the dispatch says, that quartz deposits existed in Sang Tong, but the Emperor refused to allow the mines to be worked. Two hundred and twenty-eight years ago, during the reign of Kang Hi, a quantity of gold was taken from the rock by primitive means. Mr. Kow has organized a stock company and presented his prospectus to the Emperor at Pekin. The offer of a tenth of the profits, it is alleged, has induced the ruler to give his consent. The Chinese miners will leave for Sang Tong within a few days.

GERMANY.

A cablegram from Berlin says that the German Miners' Congress will meet at Halle on September 15th, and the sessions will continue to September 20th.

MEXICO.

CHIAPAS MINING COMPANY.—Under the energetic management of Mr. Arthur Stockdale the development of the Santa Fé ore body, in the State of Chiapas, has been rapidly pushed forward durthe last few months with very rich results. The cliff proper is about 130 feet in height by 300 feet in length, and by erecting scaffolding and putting in a series of blasts the greater part of this face has been proved to consist of good average concentrating ore. The upper 40 feet or 50 feet are overhanging and cannot yet be reached, but ore has been found of excellent quality on its top, and traced east into an adjacent property. The superintendent a short time since started sinking a shaft at the foot of the cliff in order to prove up the extent of the ore body downwards. This shaft has now been sunk between 40 and 50 feet in ore, and according to last accounts was still going down on good metal. Besides, 50 meters away to the west another great ore body comes to the surface, pitching down below the point now reached by the shaft, so that, whilst to-day a face of ore exists not less than 100 feet in depth by 300 feet in length, it seems probable that before the bottom or footwall of the formation is reached there will be something like a face of 150 feet of ore proved up. As to its value nothing can be exactly known till the mill now landed at Frontera can be got into position and to work; but from assays the concentrations (10 to 12 tons into 1) will not run less than from 9 to 10 ounces gold, 30 to 35 per cent. copper per ton, and a rather uncertain amount of silver, probably about $75 to $100 per ton.

The company proposes to begin milling operations on rather a small scale, the mill now *en route* being only of 100 tons capacity per diem; but it is expected that this plant will soon be at least doubled in capacity.

The company is now reported to be surveying the rival routes to a navigable river, either the Pichucalco or Tea-pa, to the best point on one of which a narrow gauge railway is to be built.

Fresh advices from the Chiapas Zone Exploration Company, whose property surrounds the Chiapas Company's Santa Fé Mine, state that another enormous ore body (in all probability an extension of the Santa Fé) has been discovered. Two cross-cut tunnels have been started on this vein, 100 metres apart. The lower and latest has struck good ore, and the upper has already been driven through upwards of 60 feet of ore assaying, with very rough concentration, 108 ounces silver, ¾ ounce gold, and as much as 30 per cent. copper per ton. This mine has been named the Victoria. —*The Mexican Financier.*

SPAIN.

The official volume of mining statistics for 1888 shows that the minerals raised have been as follows:

Iron ores	5,609,876 tons.
Lead ores	356,545 "
Silver lead ores	183,441 "
Silver ores	134 "
Copper ores	3,202,416 "
Tin ores	115 "
Zinc ores	74,353 "
Coals	1,014,720 "
Lignite	21,845 "
Graphite	36 "
Asphalt	150 "
Antimony ores	440 "
Cobalt ores	68 "
Manganese ores	2,807 "
Sulphate of soda	177 "
Fluorspar	5 "
Sulphate of baryta	5,620 "
Phosphates	4,532 "
Steatite	738 "
Kaolin	490 "
Sulphur	132,880 "
Cinnabar	27,847 "

The metals produced in the same year were as follows:

Pig iron	252 116 tons.
Wrought iron and steel	57,000 "
Lead	161,462 "
Silver lead	73,376 "
Copper matte or precipitate	70 719 "
Zinc	26,173 "
Quicksilver	1,865 "

The comparison with former years is of little interest, as many apparent differences are only the consequence of some improvements in regard to accuracy and reliability in checking the miners' returns. A considerable decline has taken place in the raising of phosphates and sulphate of soda. As regards the first, a railway is to pass through the Logrossan deposits. As to the latter a patent taken out this year refers to dealing in a remarkably cheap way with natural sulphate of soda to make carbonate, so that this industry may improveshortly.

ASSESSMENTS.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of Sale.	Amn't per share.
Alliance, Utah		July 7	Aug 12	Sept. 1	.10
Barnes Sulphur, Utah		July 17	Aug. 25	Sept. 13	.02
Big Hole Placer, Nev		July 31	Sept. 4	Sept. 25	.01
Bona Fors, Cal	1	June 19	Aug. 11	Sept. 5	.05
Con Imperial, Nev.	28	July 17	Aug. 20	Sept. 11	.05
Exchequer, Nev.	29	July 10	Aug. 14	Sept. 4	.25
Goodman, Nev.	8	July 23	Aug. 25	Sept. 25	.05
Iron Hill, S. Dak.	18	July 21	Aug. 23	Sept. 13	.03
Locomotive	8	Aug. 13	Sept. 18	Oct. 7	.05
Mayflower, Gravel, Cal.	48	Aug. 4	Sept. 6	Sept. 29	.20
Occidental	7	Aug. 5	Sept. 11	Oct. 7	.25
Peer	9	ug. 7	ept. 19	Oct. 3	.10
Peerless	15	Aug. 14	Sept. 13	Oct. 14	.15
Teresa, Mex.	2	Aug. 13	Sept. 18	Oct. 8	.05
Union Con., Nev.	41	July 21	Aug. 26	Sept. 15	.25
Utah Con.	10	Aug. 5	Sept. 15	Oct.	.25

MINING STOCKS.

For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Minneapolis, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 231 and 232

NEW YORK, Friday Evening, Aug. 29.

Smiling faces are numerous at the Consolidated Stock and Petroleum Exchange, and "I told you so's" are floating in the air. The week under review has been a good one, the trading has been brisk and the number of shares sold is 151,805, or greater than has been seen at the Consolidated Exchange for several months past.

A speculative tendency is exhibited by dealers, who, with some exceptions, have confined themselves to the low priced stocks. It should be borne in mind that a continued demand for low-priced stocks will raise the price whether the stock has intrinsic value or not. No reason is ascribed by brokers for their unwonted spurt. They content themselves with saying that the market will be generally higher within a month or two, and they wish to get the benefit of the advance. There has been considerable inquiry for stocks which a few weeks ago

were seldom dealt in, and we have been assured that the inquiry proceeds from the public, which is once more casting longing glances at the market in which they made and lost money not many years ago.

How long the present fit of activity will hold out no one can determine, but from outward indications the coming four weeks will be the best of any previous four during the current year.

Of the Tuscarora shares Navajo had one sale at 70 cents, Commonwealth at $2@$3.15 and Nevada Queen at $1.10.

Silver King shows a solitary transaction at 50 cents. El Cristo was quiet at 75c.@85c. Mutual Smelting and Mining declined during the week from $1.60 to $1.35. Rappahanock was traded in at 5@8 cents. San Sebastian had one sale at 45 cents.

The copper stocks continue to be traded in. We note sales of Huron at $7.63@$8.25: Atlantic at $24.63; Calumet and Hecla at $305.50@308.25; Franklin at $25.75@$25.88; Kearsarge at $18.25; Quincy at $126.63, and Tamarack at $210.25@212.75.

In point of numbers the Colorado stocks represented a large amount of the transactions. Chrysolite was traded in to the extent of 5,100 shares, something unusual in this stock, and the price advanced steadily till at the close 39 cents was paid. Of Freeland 12,000 shares were disposed of at 38@40c. Leadville Consolidated was higher and firmer at 14@15c. and 20,200 shares were sold. Little Chief shows a good advance from 45@61c. this week as compared with 33@38c. last week; 12,300 shares of this stock were sold. Silver Cord had a solitary sale of 300 shares at 35c. Small Hopes was moderately traded in at 80@90c. Lacrosse was sold at 6 and 8c. Of Monitor, 1,000 shares at 2c. were sold.

The sales of the Comstock shares comprised Alta, at $1.20@$1.30; Alpha, at $1.60; Andes, at 85c.@$1.30; Best and Belcher, at $2.60@$3.80; Bullion, at $3.50@$3.80; Chollar, at $3.15@$3.50; Comstock Tunnel, at 17c., and the bonds at 24½c.; Exchequer, at 90c.@$1.25; Julia, at 35@43c.; Mexican, at $3.35@$3.50; Oriental & Miller, at 6@8c.; Overman, at $2.30; Potosi, at $6.75@$7.13; Scorpion, 35@40c.; Union Consolidated at $3.10@$3.15: Utah at 85@95c.; Argenta at 12c.; Bulwer at 29@30c.; Consolidated California & Virginia at $4.90@$5.13; Crown Point at $2.75@$3; Gould & Curry at $2.30@$2.60; Hale & Norcross at $2.75@$3; Ophir at $4.85@$5.38; Savage at $4.20@$4 25; Sierra Nevada at $2.85@$3 10; Yellow Jacket at $3.10@$3.40.

Among California stocks Astoria shows numerically large transactions at 4@9c., closing at the latter figure. Brunswick was traded in to the extent of 24,800 shares at 10@13c. Hollywood, long a stranger to the Exchange, turns up this week with sales of 2,000 shares at 2c. Sutter Creek, at $1.15@$1.40, was traded in. Mono was quiet at 65@70c. Plymouth, for some reason or other, declined from $4 to $3.50. Quicksilver preferred shows a solitary sale at $43.50, while common was dealt in to the extent of 3,550 shares, at $8.50@$9.25. Standard showed an upward tendency all the week, and advanced from 70 cents to $1.20. A letter from the superintendent of the company, under date of August 21st, reports the development of a 13-foot ore body running from $13 to $67 per ton.

Phœnix of Arizona continues to be largely dealt in. During the week it ruled steady at $1 10@$1.20. Mr. H. G. Romaine, the secretary of the company, has issued the following notice: "On and after September 2d, 1890, the present lithographed certificates of the capital stock of this company can be exchanged for new engraved certificates. Shareholders are requested to bring their certificates for transfer to the office of the company as soon as possible." The certificates have been handsomely engraved by the American Bank Note Engraving Company and are far more sightly than the old ones. Mr. Bradstreet, the president of the company, in a recent letter, reports that the concentrating machinery is running smoothly and that the concentrates have run $90 a ton.

Among the Black Hills stocks, 200 shares of Caledonia were sold at $2. Sullivan Consolidated was in some demand at $1, from which price it has not moved since trading in it commenced.

Boston & Montana was quiet at $59.50@$60.75.

Horn Silver is higher, and was steady during the week at $3.60@$3.70. Stormont shows moderate transactions at 6@10c., closing at the latter figure. Ontario was steady at $45@$45.50.

Boston. Aug. 28.

(From our Special Correspondent.)

The market has shown a strong upward tendency the past week, especially for the dividend-paying stocks, and the small offerings show that holders have a good degree of confidence in the investments and are well satisfied with the prospects for the future. The weak spots are in the stocks of the mines undergoing process of development, and which have not, so far, come up to the expectations held out in the early reports. The pressure for money has been so great that dealings have been restricted to a greater degree than the situation of the market for ingot copper both here and in London would seem to warrant; but with the return of easy money we look for greater activity and much higher prices.

Allouez has held very firm at $8¾ to $9, with good buying, and there has been no pressure to sell it. We look for a sharp rise in the near future.

Atlantic has advanced from $23 to $24½, and the advance brings out very little stock. It is well held and will go higher.

Boston & Montana touched $61 this week, with reaction to $58½. Butte & Boston also sold up to $23, losing $1½ in the later sales. Both of these stocks are more or less manipulated in the market, the fluctuations affording good opportunities for making turns. Calumet & Hecla advanced from $300 to $310 on good buying orders, and held the advance within one dollar, latest sales being at $309.

Centennial & Kearsarge have been the weak spots, the former selling off from $26¼ to $21. The stock has been quite freely offered and yielded readily to the pressure on realizing sales. A recent dispatch says that the lode, which was looking poorly a few days ago, is now showing a marked improvement.

Kearsarge sold from $18 up to $21¼, falling back to $19 on later sales. The development work on this mine is progressing favorably, but as yet nothing definite has been found to warrant a much higher price for the stock.

Osceola has been in good demand at advancing prices. The stock opened at $41¼ and sold to-day at $45½. The outlook for good and increasing dividends the coming year is very flattering and the stock is considered cheap at present prices.

Franklin sold up to $26½ on the revival of the report that the company had obtained an option on the mineral rights to the 80 acres north of its present location. The advance was not maintained, the stock selling to-day at $25.

In Quincy the transactions have been light—regular stock sold at $127, and 50 shares at $130, buyer's option 60 days.

Tamarack has ruled quite firm at $210@$213, the market taking all offered at these prices.

Huron advanced from $7½ to $8½, with later sales at $8¼.

National sold at $2⅝@$2½ for 300 shares.

Arnold sold at $1.60; Humboldt at 60c.; Ridge at $1¼@$1: Tecumseh at $4: There was quite a little spurt in Santa Fe, selling from 50c. to 70c. We hear of nothing new in its affairs to warrant the advance.

The subscriptions for the stock of the new Pacific Copper Company exceed the amount required, although the privilege does not expire until September 1st.

The silver stocks are in better demand, and we look for considerable activity in them during the coming months.

Catalpa sold at 47½c. and Crescent at 19@20c., Dunkin at 60c. The net earnings of the Dunkin for month ending August 16th were $3,645.50, which is to be used for development work in the new mine, the prospects of which are said to be very encouraging.

The demand for Catalpa and Crescent comes from Leadville and New York, and it is reported that about 30,000 shares have been shipped to these points the past ten days.

Kansas City. Aug. 25.

Company.	Opening.	H.	L.	Closing.	Sales.
Argonaut	30	35*	28	35*	3,000
Bates-Hunter	31½	35*	34½	35*	1,600
B'g Six	9¼	9¼	9¼	9¼	200
Brownlow	...	...	...	...	...
Cash Gold	15*	17‖	15*	17‖	800
Clay County	42‖	42‖	38½	42‖	2,200
Diamond B	5½	5½	5½	5½	400
Hard Money	4†	....	...	5†	....
Hunki Dori	8†	16‖	8†	10†	600
Iron Clad	18½	18½	18½	18½	1,000
Kansas City M. & M. Co	2.60	2.60	2 57½	2 60	110
King Jack	...	...	...	...	...
Little Nugget	59½†	59½	59½	59½	400
Little Rule	60†	....	....	....	....
May Mazeppa	73	75*	72	75*	3,900
Minnequa Zinc M. Co	31	33*	31	32	5,900
Monte Cristo	5†	....	....	6‡	....
Morning Glim	47½‡	47½‡	47	47	100
Pay Rock	6	6	6	6	1,200
Pelican	22½	24*	22	22	700
Potosi	10†	....	....	11†	.....
Running Lode	18†	....	....	..	....
Sylph	16†	20‡	....	15†	.....
Total					22,110
Pit sales					.....

†Bid. ‡Asked. * Buyer 30. § Seller 30. §* Seller 60. ‖ Buyer 60.

Denver. Aug. 25.

(From our Special Correspondent.)

The market for the three first days of the past week was fairly active, orders having been held for return of absent brokers; balance of week moderate and careful. General outlook for advances in many stocks, and increase in business is bright. Meetings of directors and the several committees for the settling of proposed and neglected business would prove beneficial, and undoubtedly increase outside interest.

May Mazeppa, Little Rule, Argonaut and Diamond B. were the main features in trading. Ores are coming in quite freely, and the gross tonnage increasing from many of the old as well as new camps. I hear of quite a number of bonds and leases on old properties that are being taken in the interests of home capital and on properties owned by Eastern men, from the dumps of which money will be made at the present railroad rates and prices of silver, lead and copper. I Would advise investigation by Eastern owners, so that profits for past outlays would in a measure accrue to them.

Prices and sales during the week ending August 23d, 1890:

Company.	Opening.	H.	L.	Closing.	S.
Alleghany, Colo	14	*15¼	14	14¼b	1,600
Amity, Colo	05¾	*09	04¾	06b	5,600
Bangkok, C. B., Colo	11¾b	12	10¼	10½b	10,400
Bates-Hunter, Colo	45	45	35	35½b	21,600
Brownlow, Colo	09	10	09	09½b	1,100
Calliope, Colo	37½b	38	37	36½b	1,100
Cash	12b	13	13	12½b	200
Clay County, Colo	37b	*41	38	39½b	6,300
Hard Money, Colo	05½b	05½b	05	05b	4 0
Little Rule, Colo	61	*65	61	63b	11.200
Matchless, Colo	200b	250b	150b	250b	.....
May-Mazeppa, Colo	71	76	71	73b	20,800
Mollie Gibson, Colo	30b	35	35	30b	100
Oro, Colo	250b	250b	z40b	250b	.....
Pay Rock, Colo	06	*06¾	06	06b	4,900
Puzzler, Colo	15	*16½	15	14¾b	6,300
Reed-National, Colo	68b	72b	70	71b	500
Running Lode	18b	18¾b	16b	18½b	.....
Silver Cord, Colo	2:b	2 .b	20b	25b	.....
Whale, Colo	21b	24b	23	22b	200
Prospects:					
Argonaut, Colo	2 ½	33	25½	30b	9,800
Aspen United, Colo	06b	08	06½	07b	3,700
Big Indian, Colo	*12	12½	11½	11½b	10.300
Big Six, Colo	08½	10	08½	09¼b	5,500
Claudia J. Colo	11	*12	09¼	09¼b	9,700
Nat. G. & Oil Co	22	22	‡18	21b	3,900
Diamond B., Colo	05¼	*0	04¾	05b	56,400
Emmons, Colo	*26	*26¼	24	24b	9,500
Golden Treasure, Colo	16½b	17½b	17	17¼b	400
Ironclad, Colo	19b	20	19½	19½b	3 0
John Jay, Colo	15b	18¾	*17	18½b	3,200
Justice	13b	14	14	13b	100
Legal Tender, Colo	04½b	04½b	03¾	03¾b	5,600
Morning Glim, Colo	47b	48b	47	48b	500
Park Consolidated	20b	20½b	20b	20b	.....
Potosi, Colo	11¾	12	09½	10b	5,400
Rialto, Colo	57a	50	50	45b	100
Total for the week					216,700

*Buyer 30 days. †Buyer 60 days. ‡Seller 60 days. §Seller 30 days a Asked. b Bid.

Lake Superior Iron and Gold Stocks.

(Special Report by David M. Ford, Houghton, Mich.)

IRON MINING STOCKS.

Name of company.	Par value.	Bid.	Asked.
Ashland Iron Co	$25.00	$55.00	$60.00
Aurora Iron Co	25 00	7.50	8.50
Champion Iron Co	25 00	115 00	125.00
Chandler Iron Co	25.00	40.00	45.00
Chapin Iron Mining Co	25.00	...	...
Chicago & Minn. Ore Co	100.00	115.00	118 00
Cleveland Iron Co	25.00	18.00	19.00
Germania	25.00	11.50	12.00
Jackson Iron Co	25 00	110.00	125.00
Lake Superior Iron Co	25 00	68.00	75.00
Milwaukee Iron Co	25.00	5.50	6.50
Minnesota Iron Co	100.00	87.00	89.00
Montreal Iron Co	25.00	9.00	10.00
Norrie (Metropolitan)	25.00	75.00	80.00
Odanah Iron Co	25.00	20.00	22.00
Pittsburg Lake Angeline Co	25.00	175.00	185.00
Republic Iron Co	25.00	41.50	42.50

GOLD MINING STOCKS.

Name of Company.	Par value.	Lowest.	High.
Gold Lake Mg. Co	....	....	....
Grayling Gold & Silver Co	$25.00	....	....
Michigan Gold Co	25.00	*$1.35	*$1.50
Peninsula Gold & Silver Co	25.00	....	.50
Ropes Gold & Silver Co	25.00	1.75	2.00

* Assessment paid.

Minneapolis. August 26.

Company.	Bid.	Asked.
Algoma	.30	$1.00
Aurora I. M. Co	7.50	...
Badger Silver Mg. Co	5.00	10.00
Black Hills Tin M. Co	....	1.50
Canada G. Mg. Co	.20	.50
Carbonate Hill Mg. Co	.50	1.00
Clingstone I. Mg. Co	....	....
Crescent I. Mg. Co	1 00	....
Deer Lodge Mg. & Sm. Co	....	....
Derwood Con. Mg. & M. Co	....	....
Dot Iron Mg. Co	....	....
El Dorado I. Mg. Co	....	1.00
Fairview S. Mg. Co	....	.50
Glengary S. Mg. Co., Mont	....	....
Gogebic Iron Co	....	....
Iron Duke Mg. Co	1.00	1.50
Kakabeka Mg. Co	.25	1.00
Keystone Mg. Co	.20	1.00
La Belle I. Mg. Co	1.00	1.50
Marquette Iron Synd.	....	3.50
Minnehaha M. Co	....	2.00
North Pabst I. Mg. Co	....	....
N. W. Coal Mg. Co	3.25	3.75
Stengle L. & M. Co	1.00	1 50
Thunder Bay G. & S. M Co	.75	1.00
White Spar Mica Mg. Co	1.75	2.00

St. Louis. Aug. 27.

(From our Special Correspondent.)

The market continues dull, and there is little activity shown in stocks. Central Silver made the only fair showing for the week, while many stocks were totally neglected.

The Bi-metallic made a 24-bar shipment, containing 26,242 ounces of silver and 22 ounces of gold.

The Granite Mountain's shipment consisted of 51 bars, containing 68,100 ounces of silver and 171 ounces of gold.

C. W. Prange, vice-president of the Yuma, has been sent down to the mine to look into and push affairs.

Cœur d'Alene has declared a 4c. dividend, payable on August 28th. This makes its seventh,

and consists of $20,000, making a total disbursed this year of $60,000.

Prices and sales for the week ending August 27th:

Company.	Opening.	H.	L.	Closing.	Sales.
Adams	$1.40	1.65	1.35	1.65	100
American & Nettie	1.75	....	....	1.70	200
Central Silver	.17¼	.18¾	.16¼	.18¾	7,300
Cleveland-Colo	.04	....	....	.05	.....
Gold King	.02	..	...	.03½	.....
Granite Mountain	46.00	....	....	44.75	.....
La Union	.08	.09½	.07½	.08½	3,800
Little Albert	.37½	....	.28¾	.32½	400
Mickey Breen	1.05	1.15	1.05	1.12½	100
Major Budd	.11½	.12	.10¼	.11	700
Mexican I'prove'nt	.15	.15	.12½	.14	200
Mountain Key	.50	.56½	.50	.52½	500
Montrose Placer	.68¾	....	....	.50	200
Pat Murphy	.15	....	.14	.14½	2,500
Richmond Hill	.27½	....	....	.35	.....
Small Hopes	.81¼	.82½	....	.80	.....
Silver Age	1.47½	....	....	1.42½	200
Tourtelotte	.04	....	.03	.03½	600
Yuma	.57½	.60	....	.58¾	450
Total					17,250

PIPE LINE CERTIFICATES.

(Specially reported by Messrs. Watson & Gibson.)

The traders in petroleum have been disappointed this week. The prices of both Pennsylvania and Ohio oil have gone down, without any apparent reason other than a slight pressure to sell, which can hardly be said to be natural. The market is very narrow, and small orders influence it easily. We are inclined to think that, before very long, it will get a sharp turn upward, for all the information from abroad is that Russian oil is losing its hold on the European markets, and the price of this commodity at home has consequently failed to keep pace with the prices of all other commodities.

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 23	86	86	86	86	1,000
25	87	87	86	86¾	50,000
26	86½	86½	85¼	85¼	32,000
27	85	85	83¾	84⅛	55,000
28	85	85¼	85	85¼	25,000
29	84	84	83	84	46.000
Total sales in barrels					209,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 23	85¼	86⅜	85¼	86⅜	17,000
25	86⅜	87	86¼	87	44,000
26	87	87¼	85¾	85¾	45.000
27	85½	85½	83⅝	84¼	58,000
28	84½	84⅞	84	84⅜	35,000
29	84½	84½	83	83½	69,000
Total sales in barrels					268,000

BUCKEYE PIPE LINE CERTIFICATES.

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 23	35½	35½	35¼	35¼	25,000
25	34½	34⅛	34¼	34¼	54.000
26	35¼	36	34¾	34¾	73,000
27	34½	34½	33⅜	33⅜	43,000
28	33½	34	33½	34	28,000
29	33	33¾	32¼	33⅜	110,000
Total sales in barrels					333,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 23	34⅛	35⅛	34	34	21,000
25	34¼	35⅛	34	34¾	46,000
26	35	36	34⅞	35⅞	36,000
27	36	36	32¾	33⅝	48,000
28	33⅞	34⅛	33	33¼	14,000
29	33⅜	33⅜	32⅞	33⅜	38,000
Total sales in barrels					203,000

COAL TRADE REVIEW.

Statistics.

NEW YORK, Friday Evening, August 29.

Mr. John H. Jones, chief of the Bureau of Anthracite Coal Statistics, furnishes us the following statement of shipments of anthracite coal (approximated) for the week ending August 23d, 1890, compared with the same period last year:

Regions.	Aug. 23, 1890.	Aug. 24, 1889.	Difference.
Wyoming Region Tons	384,343	428,160	Dec. 43,817
Lehigh Region "	131,541	133,075	Dec. 1,534
Schuylkill Region "	187,283	232,468	Dec. 45,185
Total	703,167	793,703	Dec. 90,536
Total for year to date	21,114,538	21,535,263	Dec. 420,725

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending August 23d, and year from January 1st, in tons of 2,000 lbs.: Week, 102,376 tons; year 3,439,380 tons; to corresponding date in 1889, 2,758,465.

PRODUCTION OF BITUMINOUS COAL for week ending August 23d and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

	1890. Week.	1890. Year.	1889. Year.
Phila. & Erie R.R	3,696	86,604	45 479
Cumberland, Md	*82,741	2,404,865	1,962,397
Barclay, Pa	*3,461	96,743	73.175
Broad Top, Pa	7,893	324,226	204.215
Clearfield, Pa	57,321	2,445,071	1,972,685
Allegheny, Pa	22,974	850,182	495.694
Beach Creek, Pa	28,145	1,202,187	945,059
Pocahontas Flat Top	39,820	1,234,307	1,106,917
Kanawha, W. Va	*36,742	1,301,487	1,111,290
Total	282,793	9,946,172	7,916,911

* Estimated.

WESTERN SHIPMENTS.

Pittsburg, Pa	12,050	541,600	395,514
Westmoreland, Pa	10,638	796,843	909,852
Monongahela, Pa	13,336	313,131	257,095
Total	36,024	1,651,874	1,562,461
Grand Total	318,817	11,598,046	9,479,372

Anthracite.

Every company was represented to-day at the meeting of the anthracite coal sales agents. The meeting was one of the most enthusiastic of the year, and was marked by an unusual unanimity. "Everything looked rosy," said one of the agents after the session. "We had a sort of experience meeting, and all agreed that the prospects for the fall and winter season were very good, and the outlook encouraging all round." While they were at it they fully discussed recent unpleasantnesses, and called several of their number "over the coals" for recent cutting in scale prices, winding up with the understanding, which fell little short of a solemn pledge, that the scale will hereafter be rigidly adhered to.

The output agreed on for the month of September was 3,250,000 tons, which it is confidently expected the market will take, as the output for the month of August almost reached that amount. The scale of prices was raised about 15 cents a ton, which will be good news to those retail coal-dealers whose yards are now brimming over with coal bought at May, June and July prices.

The market during the past week has been much healthier than of late. There has been more inquiry, and it is evident that with the return to town of those interested the consumer is also beginning to come into the market. Despite the full yards and the large stocks generally on hand, the official returns show that up to August 23, this year, there had been mined 420,725 tons less than during the corresponding period of last year. So that unless there is to be a marked falling off in the consumption of anthracite this year and in future, there is every prospect, with the output strictly confined to the above tonnage, that coal will move along very briskly during September.

The prices agreed upon for September at the meeting of the sales agents to day are: Stove, $4.15; egg, $3.90; chestnut, $3.75: broken, $3.55. There is little pea and buckwheat moving, and the large stocks of coal on hand have so weakened the price that few care to quote.

Bituminous.

The soft coal market has been considerably affected during the past week, indirectly, by the recent strike on the Central Railroad. The diversion of much of the freight carrying from the New York Central & Hudson River Railroad to the Pennsylvania Railroad, together with the seasonable activity, has so congested the latter's freight-carrying facilities that a large tonnage of soft coal, recently mined, has had to stand still at the other end. Although stocks of bituminous have been increasing recently, this stoppage has found several operators short, and they have had to borrow coal from each other to fill running contracts.

The market, however, retains much the same character as last week, and is dull and rather weak for small transactions. Soft coal operators continue to expect some effect in this market from the Welsh and Belgian colliery strikes. The Central and South American consumers of Cardiff coal do not carry large stocks, as the supply has hitherto been very regular. Now, however, that this supply has been cut off, they may have to look e sewhere, and American coal is the most available. The increase in price of English coal, which is now about 50 per cent., will, if it keeps on, as present indications suggest, give color to the American expections.

Some operators report that they are taking advantage of the present low water freights, and are piling up stocks. Freights from Philadelphia to Boston, at 75 cents, are 5 cents lower than they have been for several years.

The National Executive Board of United Mine Workers has ordered a strike of the miners at the Cresson & Clearfield Company's mine at Amsbry, Cambria County, Pa., on precisely similar grounds as those on which the N. Y. C. & H. R. R. strike was recently ordered. The men have published the following in local papers:

"ATTENTION, MINERS!

"All miners and mine laborers are hereby notified to steer clear of Amsbry, Cambria County, Pa., as the men at that place are on strike, having the approval of the District and National Executive Boards. The company is attempting to break up the local branch of the United Mine Workers of America.

"JAMES WHITE, Hontzdale, Pa.,
"Master Workman and President, District 2."

A representative of the Cresson & Clearfield Coal and Coke Company stated to a reporter of the ENGINEERING AND MINING JOURNAL that the mine is still working, and that new men are being secured at the rate of ten or fifteen a day. "The strange part of the affair," said he, "is that there was no cause for a strike, the men being discharged for neglect of duty. The mine superintendent is a great friend of the Knight of Labor and United Mine Workers' Association."

The prices of soft coal in this market nominally the same as last week, but it is generally admitted that they are not lived up to. At Baltimore, $2.40 @$2.50 f. o. b.; Philadelphia, $2.50@$2.60; in New York harbor, $3.25; alongside, $3.50.

Boston. Aug. 28.

(From our Special Correspondent.)

The anthracite coal market is very dull, and no noticeable improvement is looked for until after September 1st. The truth is that in the New England market—I do not know how it is elsewhere—consumers have in the last few years come to see that they save no money by buying a winter supply of coal before fall, and therefore put off their orders. Such trade as there is comes wholly from those retailers who take advantage of very low freights to take on one or two cargoes. Almost every retailer has his sheds full, and is waiting impatiently for a rushing business, which he has a right to expect very soon. There is much confidence felt in the wholesale situation. Talk of an advance in September does not go far, but nearly every one thinks that coal will not go lower. The restriction lately set on foot is beginning to tell. Egg sizes are short, and there is considerable detention on some kinds; $3.75 f. o. b. at New York is a fair figure on egg, which is selling at about the same price as stove. The small sizes are beginning to be rather scarce. Pea and buckwheat of well-known character are to be had on sellers' rather than buyers' terms. Broken is fairly plenty and stove coal continues cheap, although there is no especial weakness to note.

Bituminous coal moves slowly, so far as new business goes. The New York Central strike has not delayed coal seriously, and no especial apprehension is felt on this score. Cumberland coal is selling at $2.50 f. o. b. at Philadelphia and $2.30@ $2.35 at Baltimore. Clearfield is selling at $2.25 at Philadelphia. There is no serious detention on Cumberland coal as yet, and it is hoped from the present outlook that there will be less trouble than last year. Shippers have filled their consignees' wharves and storehouses full of coal in order to get advantage of low freights, and everything unites to make the season a satisfactory one.

The freight situation is unchanged. Low prices rule: quoting New York 50 to 55 cents; Philadelphia, 70 to 75 cents, and Baltimore, 90 cents to $1. It is a good many years since rates were lower than these, and yet many of the vessels seem to make money. The high ice freight on the return trip and the quick passages which have characterized the season have helped out greatly.

Retail trade is still quiet and featureless.

The receipts of coal at this port for the week have been as follows:

	For the week 1890.	For the week 1889.	Since Jan. 1 1890.	Since Jan. 1 1889.
Anthracite	45,612	48,798	1,061,967	1,014,880
Bituminous	20,873	15,625	631,131	641,672
Total	66,485	64,423	1,693,098	1,656,552

Buffalo. Aug. 28.

(From our Special Correspondent.)

The monthly meeting of the anthracite coal shippers was held here yesterday. There was a very large attendance. W. E. R. Holden, of the Delaware, Lackawanna & Western, was chairman and Mr. W. E. Street, of the Pennsylvania, secretary. The session was a brief one, as no serious differences of opinion were presented. One change was made, viz., the schedule for Chicago and vicinity points was advanced 25c. per ton, making the prices $5.25 and $5.50 for the various sizes. It will be observed that our city's figures are unchanged as well as points east. After the meeting most of those present went on an excursion down the Niagara River.

The bituminous coal men of Buffalo, with many ladies, had their first annual excursion on August 22d, going down to Grand Island, Niagara River. Dinner and dancing, athletic games, etc., were part of the programme. The affair was a delightful one.

Freight of all kinds is received and shipped by the New York Central & Hudson River Railroad and handled with dispatch. The strike is practically over, and the business of all the railroads centering here has assumed its normal condition.

Prices of bituminous coal are unchanged; very firm.

The natural fuel gas of the Provincial Natural Gas Company, of Canada, taken from their lands about 12 miles from here, will be piped to Buffalo and distributed in certain districts of the city. It is expected that from two to three months only will be required to lay mains and make connections. The president of the company states: "The gas will be ready for use by the end of October, and you may say from me that the people who live in the districts indicated are foolish to lay in a supply of coal."

Lake freighting of coal has been very good for some days past, as the aggregate shipments given below show. Coal receipts were affected somewhat by the strike, but the stocks on hand were drawn upon. The shipments of ore from the Michigan mines seem to be about over for the season, therefore there may be some changes in coal freight rates before long, as considerable spare tonnage will be thrown on the market.

The shipments of coal from this port from August 21st to 27th, both days inclusive, were 83,620 net tons, distributed as follows: 43,100 tons to Chicago, 16,500 to Milwaukee, 5,400 to Superior, 4,210 to Green Bay, 700 to Detroit, 680 to St. Clair, 3,600 to Marquette, 330 to Bay City, 4,050 to Toledo

2,400 to Gladstone, 300 to Port Colborne and 1,950 to Port William. Total thus far this season, 1,060,010 net tons.

The rates of freight were: 60c. to Chicago; 50c. to Green Bay, Milwaukee, Depere, Portage and Kincardine; 40c. to Duluth, Superior, St. Clair, Gladstone, Ashland and Marquette; 45c. to Fort William; 25c. to Bay City, and 30c. to Toledo and Detroit.

Pittsburg. Aug 28.

(From our Special Correspondent.)

Coal.—The market rules firm with a fair jobbing demand. Before this reaches the ENGINEERING AND MINING JOURNAL over 4,000,000 bushels of coal will have left for Cincinnati and Louisville. The shortage of natural gas is certain to improve the demand for coal as soon as the cold weather sets in, hence the favorable outlook.

Nominal rates in pools:

	Per 100 bushels.		Per 100 bushels.
1st pool	$4.75	3d pool	$3.90
2d pool	4.50	4th pool	3.25

Railroad coal, $5.00@$5.50.

Connellsville Coke.—The market was firm, with a good demand, the outlook being very favorable for a good fall trade. Many of the works are making six days. Production has increased from 115,764 tons to 120,154 tons; increase, 4,390.

Week's shipments aggregate 6,284 cars; increase, 82 cars. Week's shipments to Pittsburg and river points, 1,200; points west of Pittsburg, 3,800; east of Connellsville, 1,284. These figures will be largely increased, as a great number of new ovens will soon be in operation.

The rates were for 2,000 pounds f.o.b. cars at ovens: Blast furnace coke, $2.15; foundry coke, $2.45; crushed coke, $2.65.

Freights to Pittsburg 70c. per ton; Mahoning and Shenango Valleys, $1.35; St. Louis, $3.35; Cleveland, $1.70; Chicago, $2.75.

FREIGHTS.

From Philadelphia to: Baltimore,† 60; Boston, Mass., *.75@.*80; Charleston, .70; Newburyport, .80; New York, †.90; Norfolk, .70; Richmond, .90; Washington, †85.

*And discharging. †Alongside.

METAL MARKET.

NEW YORK, Friday Evening, Aug. 29.

Prices of silver per ounce troy.

Aug.	Sterling Exch'ge	Lond'n Pence.	N. Y. Cts.	Aug.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.
23	4.86	54¼	1.19 1.19¼	27	4.86	53¾	1.18¼
25	4.86	54	1 19 1.18½	28	4.86	54⅛	1.18¾
26	4.86	53¾	1.18¼	29	4.86	54⅛	1.19

The United States assay office at New York reports total receipts of silver for the week to be 322,000 ounces.

The London market early this week was inclined towards weakness, but closes firm at a considerable advance and is reported in a somewhat excited condition.

Market here has been firm on liberal purchases by the government.

Silver Bullion Certificates.

NEW YORK STOCK EXCHANGE.

	Price. H.	Price. L.	Sales.
Aug. 23	119¾	119⅛	145,000
Aug. 25	119¾	118⅜	441,000
Aug. 26	119½	118	693,000
Aug. 27	119⅛	118⅜	196,000
Aug. 28	119⅜	118⅞	389,000
Aug. 29	119⅛	119⅛	365,000
Total sales			2,229,000

Foreign Bank Statements.

The governors of the Bank of England at their weekly meeting on Thursday made no change in its rate for discount and it remained at 4 per cent. During the week the bank gained £13,000 bullion, and the proportion of its reserve to its liabilities was raised from 43·70 to 45·17 per cent., against a decline from 41·71 to 40·72 per cent. in the same week of last year, when its rate for discount was 4 per cent. On the 28th inst. the bank lost £45,000 bullion on balance. The weekly statement of the Bank of France shows a loss of 3,050,000 francs gold and a gain of 1,800,000 francs silver.

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

	Bid.	Asked.
Trade dollars	$ .92	$ .95
Mexican dollars	.92	.95
Peruvian soles and Chilian pesos	.85	.86
English silver	4.86	4.90
Five francs	.94	.95
Victoria sovereigns	4.84	4.93
Twenty francs	3.86	3.90
Twenty marks	4.74	4.78
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.78	4.85
Mexican doubloons	15.55	15.70
Mexican 20 pesos	19.50	19.60
Ten guilders	3.96	4.00
Bar silver	1.19½	1.20⅛

Copper.—The better demand which we had to report for Lake Copper has continued, and larger sales are reported from first hands than for some weeks past. It appears that manufacturers are all well stocked with orders. The quieter tone which existed lately was only one of those instances which so often occur in the trade. A decidedly better tone existed for Arizona copper at 15¼@15½c., but casting copper is still neglected at 14⅝@14¾c. The sale of 50 tons of Lake copper for export at 17½c., which we mentioned last week, has been confirmed.

Advices which come to hand from Europe are rather encouraging. It appears that India has sent rather large orders, and most of the manufacturers are busy to the utmost of their capacity. Trade in general appears to be good in Europe, and the shipping trade is said to absorb rather a large quantity of copper, besides the usual consumption for other purposes.

The market for Chili bars and G. M. B. copper has further advanced and touched the highest point on Wednesday, when £60 5s. was paid for spot copper, this being the highest price on record since the failure of the French syndicate. Our closing prices are: Spot, £60 2s. 6d.@£60 5s.; three months, £60 7s. 6d.@£60 10s. For refined and manufactured sorts the latest quotations are as follows: English tough, £62@£63 10s.; best selected, £65 10s.@£66; India sheets, £66@£67; strong sheets, £70@£71, and yellow metal, 6¼d.@6½d. A very large business is reported in yellow metal at 6¼d., with buyers later on at the higher price.

The exports of copper during the past week were as follows:

		Lbs.	
To Rotterdam.	Copper.		
S. S. Maasdam	18 casks	22,500	$3,575
S. S. Sparndam	27 casks	33,750	5,764
To Hamburg.	Copper.	Lbs.	
S. S. Ems	27 casks	33,750	$5,764

Tin.—With a good consumptive demand going on, light arrivals and a rising market in London, prices have considerably advanced during the week. The transactions recorded on the Stock Exchange are not of great amount, but consumers have entered the market quite freely, and have taken up large quantities. We close at the best with buyers for spot at 22½, September at 22·10, October at 21·90, November at 21·90.

From London we hear that shipments from the east for the current month are estimated to be moderate, with deliveries going on at a very fair rate; the effects of the higher prices for silver on Eastern Exchange are being now felt more and more, although not yet by far to the full amount of the increase in price of this metal. Prices have advanced from day to day and close with spot at £98 10s.@£98 12s. 6d.; three months at £98 15s.@£98 17s. 6d.

Lead has had a further and considerable advance this week. Western smelters abstain almost entirely from making any offers for August or September shipment and are unwilling to part with any lead for October shipment, unless at very high prices. Stocks on the spot are evidently low and in a few hands only; and while early in the week a few small lots could still be obtained at 4·65c., prices advanced rather rapidly and considerable sales have taken place at 4·70@4·75c. At these prices, only very little is now to be had.

London also reports a firmer tendency, and we quote Spanish lead at £13 2s. 6d. and English lead at £13 7s. 6d.

The St. Louis Lead Market.—Messrs. John Wahl & Co. telegraph us as follows: "There has been no abatement in the demand for pig-lead since our last report. Due to there being more buyers than sellers, the price of the metal has advanced from 4.47½@4.55c., at which figure it is no easy matter at present to procure much lead. Probably 800 tons have been sold within the range above named. We think the present prices are healthy and fully warranted. The production of lead is not keeping pace with the continued increased consumption."

The Chicago Lead Market.—Messrs. Everett & Post telegraph us as follows: "Lead has been strong and active during the week, and at higher prices under large inquiry from the East. Values have advanced to 4·60c.@4·65c. Sales foot up over 500 tons. At the close the market is very strong; 4·62½c. to 4·65c. asked, 4·60c. bid."

Spelter remains quiet but rather firm at 5·50c.@5·55c. The foreign market is strong. In London good ordinaries are quoted at £24 5s.@£24 7s. 6d and specials at £24 10s.@£24 12s. 6d.

Antimony continues firm, with Cookson's at 22½c.@23c.; L. X., 21c.@21½c., and Hallett's at 20¼c.@20⅝c.

Nickel is in good demand at from 80c. to 85c.

Quicksilver.—Only the ordinary amount of business is going on in this market, which is rather quiet just now. Quotations are: London, £10 5s. and New York, $54@$55.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, August 29.

The only change in this market to record for the week is that dealers and manufacturers are returning from their vacations, and are, after a few hours of "bull" bluff, settling down to the rock bottom fact that the market is very dull and equally firm. It is firm principally because the supply is kept down to the demand.

The coal strikes in Wales and Belgium continue and the latter is reported, according to latest dispatches, to be spreading. Although this fact can have no direct effect on this market, dealers in pig iron and steel rails are looking hopefully to the continuance of the labor troubles in Europe. Scotch pig iron is a very insignificant factor in this market, as are the French and Belgian manufactures of the same. But when these industries in Scotland, France and Belgium are virtually tied up by the strikes in the coal mines, this market must feel the effect, if only sympathetically. While the American market can scarcely expect to successfully compete with these markets under ordinary conditions, the stoppage of regular supplies raises possibilities to respectable proportions. All manufactured iron seems to be feeling the turn of the tide first, while forge and pig iron maintain the *status quo*.

American Pig Iron.—No. 1 Southern pig iron continues to be scarce, and judiciously so, for there is practically no demand that cannot be supplied. Prices are quoted by all concerned as $17@$18, but several dealers assert that a good substantial order at the lower figure could be filled, and, if required, repeated. One dollar less is quoted for No. 2, but $16.50 would probably be snapped up if buyers wanted quantities. No. 3 is quoted at $15.25@$15.50, without much present demand. Southern car wheel iron is quoted, for Nos. 3 and 4, at $20@$20.50, though no one claims to be doing any business in this metal just now. Northern remains, No. 1, $18@$18.50; No. 2, $17@$17.50.

Scotch Pig Iron.—In the Scotch and English markets, Scotch pig iron has gone up to 50s. 3d. This rise is not the effect of any cornering of the market, or of the manipulations of the syndicate of English and American capitalists. It is simply the echo of the coal and railroad strikes, which are still on, and reported to be spreading. If they continue, the indirect effect on this market will be palpably evident before long. Although nothing is doing in Scotch pig just now, those usually dealing in it quote: No. 1 Coltness, $24.50@$25; Dalmellington, $21.50@$22; Eglinton, $20.75@$21.

Spiegeleisen and Ferro-manganese.—This market is absolutely quiet, but firm, and does not seem to be much affected by the trouble abroad, because at this time scarcely any quantities of either material are moving hitherward. For German spiegeleisen, 20 per cent., we quote, as last week, $30.25@$30.75, at which figure orders can be filled. For English, from 75c.@$1 a ton higher. For 80 per cent. ferro-manganese the market is a trifle firmer, with little demand and a supply only equal to the occasion, prices being $73.75@$74.50. In the absence of actual quotable transactions, however, these figures must be taken as nominal. There is little expectation that last year's figures will be realized.

Steel Rails.—Very little is doing, and the nominal price of $31 is still quoted, though any considerable order could undoubtedly be filled at a slight reduction. The fact that the production so far this year is somewhat in excess of the production of last year, while the demand has not increased proportionately, is beginning to be considered. The market, however, is confident and expectant, and not inclined to cut below $30.75.

Rail Fastenings.—Business continues very dull, but a revival is expected in the near future. Spike makers are talking increase in prices, but for the week we quote same as last week: Spikes, 2c.; angle plates, 1·75@1·80c.; bolts and square nuts, 2·70c.; hexagonal nuts, 2·95@3c.; complete joint, iron and steel, according to weight.

Tubes and Pipes.—The expectation of several large contracts is keeping present business up to good pressure. Most of the manufacturers are up to their eyes at present in the contracts which have been given out during the past six weeks. The outlook is very promising, and an increase in prices at the next meeting is not improbable. Last week's prices hold good. Ruling discounts on car lots: 47½ per cent. on butt, black; 40 on galvanized; 60 on lap, black, and 47½ on lap, galvanized; 40 on 1¾-inch boilers; 50 for 2 to 4-inch and 52½ on larger than 4-inch casing, all sizes, 50 per cent.

Merchant Steel.—Business is resuming spring activity; the mills are opening up, and, though there is no change in prices, there is confident expectation that the coming busy season will see figures rise. We quote: Best English tool steel, 15c. net; American tool steel, 7½@10c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3¾c.; open-hearth machinery, 2¾c.; open-hearth spring, 2¾c.; tire steel, 2¾c.; toe calks, 2¾c.; flat file, 4¼c.; mill file, 5¼c.; taper file, 7¼c.; first quality sheet, 10c.; second quality sheet, 8c.

Old Rails.—Nothing doing. What small stocks are in this market are held for prices buyers will not pay at present. $26.50 might bring out a few thousand tons, but no one seems inclined to go over $25@$25.50. One holder of nearly 4,000 tons, to whom we referred two weeks since as holding for $28, this week refused the quoted price for the lot.

Structural Iron and Steel.—Manufacturers are busy on contracts, and new orders for large buildings continue to come in. While the market is as

firm as firm can be, there is no indication of an immediate rise. Prices are: Universal plates, 2·20@2·28c.; bridge plates, 2·15@2·20c.; angles, 2·10@2·15c.; tees, 2·65c.; beams, 3·10c.

Cleveland. Aug. 28.

(From our special correspondent.)

Since my last report to you, dated July 31st, the activity to which I referred in the ore market has continued, and it is estimated that during the last month about 700,000 tons of ore have been sold. Most of this was "non-Bessemer," the cut in prices, varying from 25c. a ton on the higher grades to 75c. a ton on the lower grades, induced buyers to put in large orders. The lowest prices were made only on large blocks, conditional on the ore being taken direct from vessels into cars. Scarcity of storage room at Lake Erie docks and the fact that some parties had more tonnage contracted for than was necessary to cover their sales necessitated the cutting in prices.

It is not now thought probable that the total shipments of this year will much exceed those of last year. Many furnace men have yet to buy ore in order to tide them over until the opening of navigation next year. In view of these facts ore dealers feel pretty confident that during the coming fall and winter prices will stiffen. A notable feature of this recent activity has been the large purchases by furnaces in Pennsylvania east of the Allegheny Mountains.

Lake freights are exceedingly dull. There is hardly enough wild ore offering to make a rate. Quotations are now as follows:

Specular and Magnetic Ores.

Bessemer	66@69	per cent	6.50@$7.25
"	60@64	"	5.25@ 6.25
Non Bessemer	65@69	"	6 00
" "	62@65	"	5.00@ 5.25
" "	57@60	"	4.00@ 4.65

Soft Hematites Dried at 212 Degrees.

Bessemer	62@65	per cent	$5.25@$6.00
"	58@61	"	5.00@ 5.25
Non-Bessemer	55@63	"	3.50@ 4 50

Above prices are delivered on docks at Lake Erie ports.

Louisville. Aug. 26.

(Special report by Hall Bros. & Co.)

There have been more liberal inquiries since our last report, but in smaller quantities, ranging from car loads to 500 tons. At shaded figures there could be round lots sold of all grades for twelve months ahead, but furnaces remain firm, and, as a rule, confine themselves to deliveries only during the present year. The stringency in the money market is exciting great interest, and may have the effect of checking the nearness of an advance in pig iron. Bar iron and steel have advanced, which is an uncommon thing before an advance in pig iron.

Hot Blast Foundry Irons.—Southern coke, No. 1, $15@$15.25; No. 2, $14.25@$14.50, No. 3, $14@$14.25. Mahoning Valley, lake ore mixture, $17.75@$18.75; Southern charcoal, No. 1, $17@$17.50; No. 2, $16.50@17. Missouri charcoal, No 1, $18@$18.50; No. 2, $17@$17.50.

Forge Irons.—Neutral coke, $13.75@$14; cold short, $13.75@14; mottled, $12.75@$13.25.

Car Wheel and Malleable Irons.—Southern, standard brands, $22@$23; other brands, $18@$19. Lake Superior, $22.50@$23.

Philadelphia. Aug 28.

(From our Special Correspondent.)

Pig Iron.—No decided changes have as yet taken place in the iron trade. A very large amount of business in Bessemer pig is in sight; a few thousand tons have been sold at $19. As soon as buyers and sellers can agree, a large amount of business will be transacted. An interesting development this week was the sale of a good deal of No. 1 foundry at $18.50. The brands were among the very best. There was also a good deal of first-class forge iron sold at $15.50, and it looks as though large buyers were about prepared to cover for two or three months to come. Some three or four makers have been disappointed in the withdrawal of several large buyers from the market, when they were thought, last week, to have about decided to purchase. The drop in freight rates will be promptly discounted, and it is stated that this is the secret of the active demand about setting in.

Foreign Material.—One or two sales of spiegeleisen were made at $31; several offers are under consideration at $30. Several lots of ferro-manganese are under negotiation, quotations ranging from $72.50@$78.

Billets.—Several large buyers are on the point of closing for foreign billets, the price named by them being $32.25. Domestic billets are selling at $33. A good deal of material is wanted.

Muck Bars.—Several offers have been made for bars at $30, but sellers are wanting 50c. to $1 more.

Merchant Iron.—Some mills have recently booked orders for prompt delivery at 1·90, and manufacturers expect a growing percentage of business at this price. A large amount of business is coming in at prices running down to 1·65. The mills all over the State are running full time.

Merchant Steel.—There is an excellent demand for all kinds of merchant steel, and Eastern mills are pretty well oversold.

Sheet Iron.—All kinds of sheet iron are in active demand, and urgent buyers have been paying an advance of a tenth of a cent for several days.

Nails.—Nails are reported in pretty fair demand, notwithstanding a few unfavorable circumstances. Quotations are 1·75 in large lots. Wire nails, $2.55 to $2.60.

Skelp Iron.—A good deal of business in skelp iron is offered, which cannot be accepted. To-day's quotations are 1·90 in small lots, for grooved, and 2·20 for sheared.

Wrought Iron Pipe.—The marking up of prices has been looked for for some days in this market. A large amount of business is being offered.

Plate Iron.—Steel plate of all kinds is under active inquiry this week. Outside quotations run from 2·50 for ship plate and tank, to 3c. for flange and 4·25 for fire box. A large amount of work is promised for the fall months.

Structural Material.—It is quite probable that there will be a permanent advance of one-tenth cent on small deliveries next month. Orders have been booked within 48 hours for sheared steel plates at 2·60. The mills are all well sold up; in fact, as far oversold as manufacturers care to be, in view of the strengthening tendency in prices.

Steel Rails.—Parties in need of large quantities of rails have been disappointed in the outcome of recent negotiations for rails to be delivered during the last three months of the year. A number of offers have been made at $30, but makers claim the lowest actual selling price is $30.50. There are certain Southern buyers in the market who are willing to contract for rails for winter delivery, provided the proper inducements can be held out. But makers are less inclined to shade prices now than two months ago.

Old Rails.—Buyers are more urgent than they have been for some weeks. There would be no difficulty in obtaining $25.50 for all the rails that could be delivered within 30 days.

Scrap.—A good deal of scrap has been offered on the market lately, but there is very little of the kind that buyers are most anxious to have. No. 1 is selling at $22.50.

Pittsburg. Aug. 28.

(From our Special Correspondent.)

Raw Iron and Steel.—Taken as a whole, the market was not so firm as last week. While certain articles showed weakness, there were others that showed increased strength; in fact, the market was divided. The volume of business shows up fairly.

Bessemer seemed to be neglected; at the same time, as far as could be ascertained, last week's figures were maintained. We heard rumors of sales being made at a slight concession, but failed to find either the buyer or the seller.

The sales of Bessemer for the present month have not been large; in fact, it would seem that consumers are supplied for the present. Besides, during the past three months considerable iron was sold that has yet to be delivered; this fact will no doubt be used to depress the market. Grey Forge was less firm than at date of last report; at the same time holders of favorite brands are not disposed to make concessions, while outside lots have to be shaded in order to effect sales.

Muck Bar is very firm and finds ready purchasers at full prices; the opinion is current that higher prices will rule in the near future.

Skelp Irons are much fancied, with prices looking toward an advance.

New Steel Rails are not so firm; we hear of sales at $31.50@$32; there seems to be a strong competition going on among dealers, which no doubt is the cause of the decline mentioned. The demand is reported active and business good.

Steel Billets are steady, prices maintained for both descriptions.

Ferro-manganese.—The demand has fallen, producing a material decline in values, the supply being in excess of the demand.

Old Iron Rails are firm, prices still on the up grade; we heard of a round lot being sold f. o. b. Chicago, $26.75.

Bloom and Rail Ends in good demand; prices steadily maintained. In view of the great activity in finished iron, it is generally believed that pig-iron must soon become in greater demand, and this prospect ought to give increased strength to the market. The production of pig-iron during the first six months of this year was 5,164,695 tons, against 4,415,084 tons for the last half of 1889. While this represents an increase of 749,611 tons in six months, the accumulation of stocks in the same period was only 133,000 tons, showing that the increased output was almost all absorbed by the increased consumption. As far as the statistical situation is concerned the decreasing production and the increasing consumption argue strongly for higher prices for pig-iron, but the course of the market does not fully sustain that theory.

Coke Smelted Lake and Native Ores.

3,000 Tons Grey Forge at City Furnace	$15.25 cash.
3,000 Tons Grey Forge, Sept., Oct.	15.50 cash.
1,500 Tons Grey Forge	15.25 cash.
1,000 Tons Grey Forge	15.25 cash.
1,000 Tons Bessemer, Oct.	18.50 cash.
1,000 Tons Grey Forge	15.40 cash.
500 Tons Grey Forge	15.30 cash.
500 Tons Grey Forge	15.25 cash.
500 Tons Bessemer at City Furnace	19 00 cash.
500 Tons Grey Forge at City Furnace	15.25 cash.
500 Tons Grey Forge, Nov., Dec.	15.75 cash.
500 Tons Grey Forge.	15.35 cash.
400 Tons Grey Forge, all ore	16.50 cash.
100 Tons No. 2 Foundry	16.50 cash.
100 Tons No. 1 Foundry	17.50 cash.
100 Tons Silvery	18.00 cash.
50 Tons Silvery Extra	19.50 cash.

Charcoal.

100 Tons Cold Blast	26.00 cash.
75 Tons Cold Blast	27.00 cash
75 Tons No. 2 Foundry	22.75 cash.

Muck Bar.

2,000 Tons Neutral, Sept., Oct., Nov.	30.00 cash.
1,500 Tons Neutral	29.75 cash.
750 Tons Neutral	29.75 cash.
500 Tons Neutral	30.00 cash

Steel Billets and Slabs.

1,000 Tons Steel Billets	31.00 cash.
1,000 Tons Steel Billets	30.50 cash.
500 Tons Steel Billets	31.00 cash.
500 Tons Steel Billets	31.75 cash.
575 Tons Nail Slabs, September	31.35 cash..

Steel Wire Rods.

500 Tons American Fives	45.00 cash.

Ferro-Manganese.

150 Tons 80 per cent., Baltimore	69.50 cash
50 Tons 79×82 per cent., Pittsburgh	75.00 cash.

Bloom and Rail Ends.

600 Tons Rail Ends	23.00 cash.
500 Tons Bloom Ends	22.50 cash.
500 Tons Bloom Ends	22.55 cash.
500 Tons Bloom Ends	23.00 cash.

Spiegel.

100 Tons 10 and 15 seaboard	30.00 cash.
75 Tons 20 per cent. seaboard	32.00 cash.

Old Iron Rails.

750 Tons American T's	27.50 cash.
750 Tons American T's, f.o.b. Chicago	26.75 cash.

Scrap Material.

300 tons No. 1 W. Scrap	net 22.50 cash.
250 tons No. 1 W. Scrap, extra	net 22.80 cash.
200 tons Leaf Steel	net 23.00 cash.
200 Tons O. H. Steel	gross 22.50 cash.
200 tons Old Iron Axles	net 29.50 cash.
100 Tons Cast Borings	gross 12.75 cash.

CHEMICALS AND MINERALS.

New York, Friday Evening, Aug. 29.

Heavy Chemicals.—So far as news of interest is concerned the market for heavy chemicals shows no change from last week. The tone of the market is firm, and, in the case of caustic soda, prices have advanced slightly. There continues to be a good demand, and a good amount of business is reported.

Anent the much-discussed "Chemical Union," we can offer nothing new or particularly interesting to our readers. Positive information relating to its latest moves is difficult to obtain. Nobody seems to know much about it, but all are pretty well agreed that its formation is an assured fact. This, however, has been the case for several weeks past. To judge from our special Liverpool report, the same state of affairs prevails on the other side.

Caustic Soda.—There is not much of a spot supply here, and prices in this article show an upward tendency. Quotations are, for spot, 3·12½c. and for shipment 3 c.

Carbonated Soda Ash.—Prices for this show but little if any change. For the 48 per cent. variety 1·50 c.@1·55c. is quoted and for 58 per cent 1·45@1·50c. Buyers seem disinclined to pay these prices, and business has not been so brisk as if sellers had been willing to shade. The spot supply is light.

Bleaching Power.—There is nothing of interest doing in bleach which is in a rather unsettled condition. From 1·50c. to 1·60c., according to brand, is quoted, although sales are reported at 1·40c.

Sal Soda.—There is not a great demand for English sal soda which, nevertheless, shows a slight advance. Quotations are 1·07½c. to 1·10c. for spot goods.

Acids.—We must report a dearth of interesting features in this market. A fair jobbing trade and prices as they have been for months past is about all that can be said. We can only repeat our quotations: Acid, per 100 pounds in New York and vicinity: Acetic, $1.75@$2.25; muriatic, 18-degree, 80c.@$1.25; muriatic, 20-degree, 90c.@$1.50; muriatic, 22-degree, 90c.@$1.75; nitric, 36 degree, $2.75@$3.50; nitric, 40-degree, $3.25@$4.50 nitric, 42-degree, $3.75@$4.75; sulphuric, 60-degree 70@80c., and sulphuric, 66-degree, 80c.@$1.

Fertilizing Chemicals.—Actual business of any importance is not reported in the market for fertilizers. In a few instances prices are lower, but everything is very quiet. We quote this week: High grade dried blood, $1.75@$1.80. For the low grade the price is $1.70; Azotine, $1.90@$1.95. Tankage, high grade, 9 to 10 per cent. ammonia and 15 to 20 per cent. phosphate, $19@$20 per ton, and low grade 7 to 8 per cent. ammonia and 25 to 30 per cent. phosphate, $18@$18.50. Fish scrap, $20@$20.50 per ton f. o. b. factory. Sulphate of ammonia, prime gas liquor, $3.35; prime bone liquor, $3.15. Concentrated tankage, $1.67½@$1.70 Refuse, bone black, guaranteed 70 per cent. phosphate, $18 per ton. Dissolved bone-black is nominally 95c. per unit for available phosphoric acid, although on large lots prices might be somewhat reduced, and acid phosphate 80c. per unit for available phosphoric acid. Steamed bones, unground, $20@$23; ground, $25@$26.

Charleston rock, undried, $5.75 per ton; kiln-dried, $7@$7.25 per ton, f. o. b. vessels and cars re-

spectively at the mines. Freights by sail from Charleston to New York, $2.75@$3.50 per ton. Charleston rock, ground $11.50@$12, ex vessel at New York.

Quotations are for 48 to 52 per cent. sulphate of potash, $1.12½ per 100 pounds for shipments from date; high grade manure salts, basis 90 per cent. sulphate of potash, $2.37½ per 100 pounds.

The shipments of phosphate from Montreal as per Custom House manifests, from May 10th to August 18th, show a total of 11,580 tons, of which 5,000 tons were shipped by Lomer Rohr & Co.; 3,315 tons by Millar & Co., and 3,265 tons by Wilson & Green.

Kainit.—This article is very quiet just now. During the past season about 1,700 tons were sold, and this is being delivered now. Quotations remain $9 75 for invoice weight, and $10 for actual weight.

Muriate of Potash.—The arrivals this week amounted to some 300 tons, all of which were disposed of on previous contracts; 250 tons to arrive were sold during the week. There is a fair demand, and prices continue $1.77½@$1.82½.

Nitrate of Soda.—A fair steadiness is observable in this market, and a good many sales are reported. Quotations are $1.70 on spot, although in a large way $1.67½ would be accepted.

Brimstone.—There has been but little doing in this market. Quotations are $20.75 for best unmixed seconds, 64 cents less for best unmixed thirds. As usual, buyers are loth to come into the market at these figures, which they consider too high.

Liverpool. Aug. 20.

[Special Report by Messrs. J. P. Brunner & Co.]

On the spot most lines of heavy chemicals show an upward tendency, and a fair business passing.

With regard to the "Chemical Union," there is nothing new to report, but manufacturers still talk pretty confidently of being able to float the scheme successfully, and we expect that before the end of next month it will be definitely known either one way or the other.

Soda Ash.—There are few sellers for prompt delivery, and prices are firm at 1 3/16@1½d. for caustic, and 1¼@1½d. for carbonated, according to brands.

Soda crystals in request and firm at £3 5s.@£3 7s. 6d. per ton, according to quantity and delivery.

Caustic soda in fair demand, and, being in small compass, prices are rather dearer. Some fair sales have been made this week in 70 per cent. at £9 17s. 6d.@£10 2s. 6d, and the lower figure now refused, holders demanding £10 up to £10 5s. at the close; 60 per cent., £9 to £9 5s.; 74 per cent., £11; 76 per cent., £12.

Bleaching powder has advanced. A few days ago sales were made for America at £5 10s.@£5 12s. 6d., but makers now ask £6, although a little might be had from second hands at perhaps 5s. per ton less money. The article is in small compass, however, at the moment.

Chlorate of potash is receiving little attention from buyers at the moment, and although 5d. is the nominal spot quotation, a little might possibly be had at 4½d. per pound.

Bicarb. soda is selling at £5 15s. per ton and upward for one-hundredweight kegs, according to brand and quantity, with usual allowances for larger packages.

Sulphate of ammonia has been in request for America; £11 17s. 6d. up to 12 was lately paid for good grey 24 per cent. in double bags f.o.b. Liverpool. At the close, however, there is less doing, and the tone is scarcely so firm.

London. Aug. 15.

(Couper, Millar & Co.'s Report on the Fertilizer Market of the United Kingdom.)

The dullness mentioned in our last circular has continued throughout the month, very little business having been done in raw materials. Some manufacturers seem disposed to defer their buying until the last moment, in the hope, no doubt, of supplies from Florida being available shortly, and sellers of other phosphates compelled to reduce their quotations, while the latter are content to leave the point to be decided by time. The higher prices obtained last autumn put raisers into a better position to face the slack summer months, and consequently there has not been the same necessity for them to force their production on the market as in former years. We hear of greater activity than usual in the manure works and better prices obtained for their produce, so unless the weather is bad during harvest prospects for the coming season are distinctly favorable and encouraging.

Mineral Phosphates.—South Carolina—both land and river—seems now to be entirely off the European market and local prices have been raised. Canadian 80 per cent. is not being offered, as shippers have still a large quantity to ship in fulfilment of contracts. For 70 per cent. and the finely ground 60 per cent. in bags we would submit offers. Somme phosphate is nominally quoted at 1s. 3d. per unit with 1-5th rise, basis 70 per cent. c.i.f. London, though business has been done at a little less money. There is no inquiry for the lower grades. Belgian prices well maintained and a steady business being done in the 18 to 25, 35 to 40, and 40 to 45 per cent. qualities—prices according to port. Nothing doing in Coprolites until harvest is over.

Bone Ash, Bones and Meal.—A cargo of River Plate bones, May sailing, has just been placed at £5 10s. delivered, and good business in Indian bone meal is reported at full prices.

Sulphate of Ammonia is quoted £11 12s. 6d. London.

Nitrate of Soda steady at £8 5s.@£8 6s. 3d.

Ammoniacal Materials.—Fish guano strongly held for 10s. 3d. and 1s. 3d. per unit in buyer's bags at works; and ground hoofs and horns for 9s. 6d. per unit delivered in Thames. Dried blood selling at 10s. 6d. per unit.

Muriate of Potash is quoted at £7 5s. on 80% in bags. Kainit at 23s. 6d. in bulk, f.o.b. Hamburg in quantity. Net cash. Stassfurt weights and sampling.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, August 29.

Bricks.—In our Notes of the Week will be found the latest information relating to the difficulties among the brick men. The market for bricks naturally continues in a very unsettled condition. The demand has been light, and so far as the supply is concerned, as soon as the cargo which arrived on Saturday is exhausted, there will be practically no brick on the market. It is difficult to obtain satisfactory quotations, but we give the latest: Haverstraws, $6.25@$7; Uprivers, $6@$6.75; Jerseys, $5.50@$6.50; and Pale, $3@$3.25.

Lime.—There is nothing of any particular interest doing in the market. With the exception of one cargo there were no arrivals during the week. The demand is fairly good, and is greater than the present supply Prices continue as last quoted. Rockland, common and finishing, 90c.@$1.20; St. John, common and finishing, 85c.@95c.; Glen Falls, common and finishing, 85c.@$1.10.

Cement.—The troubles in the brick market, though they have had a general demoralizing effect on the market for building materials, have not yet had time to create a very decided feeling of uncertainty in the cement market, which continues in a good condition. We quote Rosendale, 90c.@$1; Portland, American, $2.15@$2.45; foreign, $2.40@$2.50; special brands, $2.60@$2.85; Roman, $2.75@$2.95; Keene's coarse, $4.50@$5.50; Keene's fine, $7.25@$8.50 per barrel.

NOTES OF THE WEEK.

The problem as to how the warfare between the manufacturers and handlers of bricks will end is no nearer a solution to-day than before. Five barges of brick shipped by manufacturers who do not belong to the belligerent Manufacturers' Association arrived to-day, bringing 1,000,000 brick. The barge Commodore, with a load of New Jersey brick from Sayres & Fisher, who are members of the Association, arrived at Gowanus Bay, and was promptly tied up by the walking delegates. The situation in general is the same as it was last week, except that the supply of brick is being rapidly used up, while little that comes into the market is available for building. The local manufacturers said that no Philadelphia, Baltimore or New Haven brick has been shipped here since the strike, nor is there any probability that it will be, because of the high freight charges. As we go to press the report comes that the walking delegates have raised the handlers' boycott on all the manufacturers except the original four at Verplanck's Point. If this is so, and it could not be ascertained on account of the lateness of the information, manufacturers will have to deliver brick on their contracts. The Knights of Labor, in causing the brick handlers to strike, played into the manufacturers' hands. They did not wish to ship any brick, and by pleading inability to ship their product they need not have filled their contracts, and the available supply thus would have been exhausted in a very short time. Both sides appear determined, and there is no telling when matters will be adjusted.

IMPORTS AND EXPORTS OF METALS AT NEW YORK FROM AUGUST 16 TO AUGUST 23 AND FROM JANUARY 1.

IMPORTS.

Spelter.	Week. Tons.	Year. Tons.
Amer. Metal Co....	25	297
Hendricks Bros....	.....	50
La Marche's Sons, H.....		5
Lewisohn Bros....	.....	100
Meyer, G. A. & E..	.....	9
Milne & Co.....	.....	74
Muller, Schall & Co.....		123
Total.....	25	658
Corres. date, 1889..	.....	647

Pig Lead.	Lbs.	Lbs.
Caswell, E. A.....	.....	111
Hendricks Bros...	.....	100
Naylor & Co.....	10	10
Schultz & Co., A..	.....	98
G .W. Sheldon.....	.....	149
Total.....	10	468
Corres. date, 1889..	.....	140

Tin.	Tons.	Tons.
Abbot, Jere, & Co.		125
Amer. Metal Co...	.....	2,125
Bidwell & French.		815
Bruce & Cook.....	.....	10
Carter, Hawley&Co		75
Cohen, H.....	.....	20
Cort & Co., N. L....	.....	125
Crooks & Co., R...	.....	85
Davol & Son.....	.....	34
Hendricks Bros....	6	32
Knauth & Kuhne....	.....	10
Lehmaier, S , & Co.	10	112
Lewisohn Bros....	.....	20
Merchant & Co	10	40
Muller, Schall&Co.	.....	620
Naylor & Co.....	50	1,196
Nissen, Geo	.....	10
Phelps, Dodge & Co	50	2,496
Thomson, A.A.&Co.	10	50
Thomson, D. & Co.		70
Townsend, &Co., J.R.....		50
Trotter & Co , N..	.....	75
Total.....	136	8,195
Corres. date. 1889..	263	6,960

Tin Plates.	Boxes.	Boxes.
Bruce & Cook.....	1,414	90,585
Byrne & Son.....	.....	1,000
Central Stamp. Co.		49,296
Coddington & Co...	8,210	95,705
Cohn & Co	308	14,487
Con. Fruit Jar Co.		120
Corbiere F. & Co...		7,707
Cort & Co..	1,833	130,797
Crooks & Co.....		63,474
De Milt & Co ,H R.		6,000
Dickerson, V. D. &Co	12,524	257,224
Fenton, D. E.....	1,384	3,640
Haberman, F.....		66
Herring, Chas. E.		1,000
Iron Clad Mfg. Co.	110	489
Lalance & G. M. Co.		8,788
Lazard Bros.....		1,048
Lehmaier, Schw'z &Co...		200
Merchant & Co.....	987	21,544
Mersick & Co..		8,642
Morewood & Co...		37,217
Newell Bros.		416
Payne, S. H. & Co.		784
Pratt Mfg. Co.....	2,154	93,028
Phelps, Dodge & Co	4,536	592,482
Schneider & Co., J.	500	3,365
Shepard & Co.....		4,749
Taylor, N. & G.....		1,229
Thomson&Co., A.A.	229	76,372
Warren, J. M		4,320
Wheeler & Co.....	200	23,190
Whittemore & Co.		12,953
Wolff & Reesing... ...		2,077
Wright, Peter&Co. ...		227
Total.....	34,449	1,614,224
Corres. date, 1889..	58,182	1,575,071

Pig Iron.	Tons.	Tons.
Abbott & Co., Jere.		200
Baldwin & Co., A..		807
Baldwin Bros. & Co....		170
Crocker Bros.....	100	1,200
Crooks & Co., R.....		5
Dana & Co.....		150
Drummond & Co		400
Geisenheimer & Co		76
Hagermeyer&Brun		30
Henderson Bros.		100
Irvin. R. I. & Co		300
Lillienberg, N.....		1,909
Naylor & Co.....		150
Perry & Reyer.....	53	53
Pierson & Co.		30
Sheldon, G.W.&Co.		200
Stetsson&Co., G.W.	200	2,125
Williamson, J.&Co.		1,600
Total.....	353	9,505
Corres. date. 1889...	850	20,247

Steel Blooms, Billets, and Slabs.	Tons.	Tons.
Abbott & Co.....		5
Baldwin Bros. & Co.....		2
Dana & Co...		1,670
Downing, R.F.&Co.		107
Henderson Bros....		1
Martin & Co		80
Milne, A., & Co..		68
Naylor & Co.....		339
Pope, Jas. E., Jr.		61
Richards&Co., C.B.		1
Roebling's Sons, J.A.....		2,074
Wolff, & Co., R. H.		60
Total.....		4,468
Corres. date. 1889...	455	50,472

Bar Iron.	Tons.	Tons.
Abbott & Co., Jere.		741
Bacon & Co.....	119	1,155
Crocker Bros.....		77
Dickerson, Van Dusen & Co.....		6
Downing & Co.....		285
E. J. Jacobus.....		8
Fuller, Dana& Fitz.		11
Holt, H. N.....		180
Lilienberg, N.....		447
Lundberg, G.....		2,171
Milne & Co.....		1,016
Muller, Schall &Co.		289
Naylor & Co.....	179	576
Page, Newell & Co.		1,654
Plenty, J		14
Wilson, J. G.....		3
Total.....	298	8,633
Corres. date, 1889...	359	6,143

Scrap Iron.	Tons.	Tons.
Crossman&Co., W.H.....		30
Muller, Schall&Co.		18
Samper & Co., S.		186
Stevens, Corvin &Co.....		30
Ward, J. E. & Co..		567
Total.....		831
Corres. date, 1889...		1,288

Steel and Iron Rods.	Tons.	Tons.
Abbott & Co.....	50	7,331
American S. Co....		665
Bacon & Co.....	6	469
Carey & Moen.....	25	431
Cooper, Hewitt&Co.....		371
Dana & Co.	229	803
Downing & Co....		129
Galpin, S. A.....		1,106
Greely & Co. C. S.		35
Hazard Mfg. Co .	21	370
Holt & Co., H. N....		3
Jacobus, E. Y.....		2
Lee, James & Co...		1,554
Lillienberg, N.		300
Lundberg, G.....		126
Lundell, C. G		5
Milne & Co.....		1,304
Muller, Schall & Co.		732
Naylor & Co.....	221	4,457
Page, Newell & Co.		1,229
Roebling's Sons, J.A.	120	2,277
Schulze & R.		1
Temple & Lockw'd		6
Wessel & Co.....		21
Wiebusch & Ho...		4
Wood & Niebuhr..		25
Wolf & Co., R. H..	10	2,955
Total.....	682	26,811
Corres. date, 1889...	876	36,071

Old Rails.	Tons.	Tons.
Bowring&Archibald.....		340
Dana & Co.....		750
Frankfort. M.....		5,021
Henderson Bros...		300
Hernsheim, L		350
Mosle Bros.....		123
Naylor & Co.....		1,968
Sawyer, Wallace&Co....		610
Wiechers, J. F.....	27	150
Total.....	27	9,612
Corres. date. 1889..		9,135

Spiegeleisen.	Tons.	Tons.
Abbott, Jere & Co.		2,725
American Metal Co.....		100
Blakely & McLellan.....		1,684
Crocker Bros..... ..	540	18,051
Crooks & Co. R		106
Dana & Co.....		15,900
Foley, F.....		50
Geisenheimer & Co.	100	643
HendersonBros.&Co.....		14
Hernsheim. L.....	295	16,535
Holt, H. N.....		200
Naylor & Co.....	50	10,026
Perkins, C. L.....		1,422
Sachs & Richmond.		2
Whittemore, H.&Co.		55
Total.....	585	67,513
Corres. date. 1889...	938	47,394

Iron Ore.	Tons.	Tons.
Baiz, Jacob.....		67
Bowring & Archibald.....		4,092
Earnshaw, A.....		3,517
Ennis, Andrew.....		438
Flores & Co., R. de	345	14,143
Johnson & Co., L..		5,030
Total.....	345	27,287
Corres. date. 1889..		8,660

EXPORTS.

Copper.	Pounds.	Pounds.
Abbott & Co., Jere.	22,500	2,545,103
Amer. Met. Co., L..		940,385
Barber & Co		13,750
Belmont, Aug. &Co		1,763,974
Burgass & Co.....	15,717	227,290
French, Edye & Co.....		135,374
Heidelbech, Sicher-heimer & Co		672,608
Muller, Schall & Co.....		16,250
Sawyer, W'l'ce& Co.....		22,796
Seamen, S. H.....		66,950
Ward, J. E. & Co.		100,000
Wil'ms & T'hune.		112,004
Total..... ..	38,217	6,621,484
Corre. date, 1889..	624,367	5,146,293

Copper Matte.	
AmericanMetalCo	3,072,079
Lewisohn Bros.	1,703,846
Nichols, Geo. H...	267,202
Paulsen, Wm....	1,039,428
Wil'ms & T'hune..	2,848,706
Total	8,931,261
Corres. date 1889.	2,763,002 20,001,06

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and amount of last.			Dividends. Total paid.	Date and amount of last.		
1	Adams s. L.	Colo	$1,500,000	150,000	$10	*	....	....	....	$555 000	Jan.	1887	.10
2	Adice, *. C	Mont	10,000,000	400,000	25	*	....	....	....	850,000	July	1890	.06¼
3	Alma&Nel Wood C.,G	Idah	300,000	30,000	10	*	....	....	....	60,000	Jan	889	.50
4	American & Nettle,C.	Colo.	.....	300,000	..	.....	....	....	....	180,000	Nov.	1889	10
5	Amy & Silversmith,s.	Mon.	.....	341,419	....	.....	....	....	....	247,530	Aug.	1887	12½
6	Atlantic, C	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	660,000	Aug.	1890	1.00
7	Argenta, S	Nev.	10,000,000	100,000	100	335,000	July	1889	.10	40,000	Feb.	1890	.20
8	Aspen Mg. & S., S. L.	Colo.	2,000,000	200,000	10	*	....	....	....	480,000	Aug	1890	.10
9	Aurora, I..... ..	Mich	2,000,000	100,000	20	*	....	....	....	155,000	Oct.	1887	1.87½
10	Badger, S.....	Oat	250,000	50,000	5	.....	....	....	....	37,500	Mar.	1890	.25
11	Bassick, G. S..... ..	Colo.	10,000,000	100,000	100	.....	....	....	....	400,000	Mar.	1884	1.00
12	Belle Isle, S.....	Nev.	10,000,000	100,000	100	.....	....	....	....	300,00	Dec	1879	25
13	Belcher, G. S.....	Nev.	10,400,000	104,000	100	2,028,000	Apl.	1890	.50	15,287,000	Apl.	1876	1.00
14	Bellevue Idaho, S. L.	Idah.	1,250,000	125,000	10	120,000	Dec.	1889	.25	200,000	Jan.	1847	10
15	Bodie Con., G. S.	Cal.	10,000 000	100 000	100	575,000	Nov	1889	25	1,602,572	Apl.	1885	50
16	Boston & Mont, G....	Mon	2,500,000	250,000	10	*	....	....	....	520,000	Jun	1886	.15
17	Boston & Mont., C.S.	Mon	2,500,000	100,000	25	*	....	....	....	1,450,000	Aug.	1890	1.50
18	Breece, S.....	Colo	5,000,000	200,000	25	*	....	....	....	2,000	Feb.	1880	.01
19	Brooklyn Lead, L. S.	Utah	500,000	50,000	10	.....	....	....	....	127,000	July	1887	.05
20	Bulwer, G.....	Cal.	10,000,000	100,000	10	130,000	Aug.	1889	.25	175 000	Jan.	1884	.10
21	Bunker Hill & Sull..	Idah.	3,000,000	300,000	10	.....	....	....	....	150,000	Oct.	1883	.06¼
22	Caledonia, G.....	Dak	10,000,000	100,000	100	505,000	May	1885	.15	176,000	Aug.	1890	.08
23	Calliope, S.....	Colo.	1,000,000	1	1	*	....	....	....	90,000	Apl.	1890	.01
24	Calumet & Hecla, C .	Mich	2,500,000	100,000	25	1,200,000	....	....	....	34,350,000	May	1890	5.00
25	Carbonate Hill s. L.	Colo.	1,500,000	300,000	10	*	....	....	....	80,000	Apl.	1884	05
26	Carlisle, G..... ..	N. M	1,000,000	200,000	5	*	....	....	....	175,000	Oct.	1888	.12½
27	Castle Creek, G.....	Idah.	100,000	100,000	1	.....	....	....	....	51,000	Oct.,	1883	.03
28	Catalpa, S. L.....	Colo.	3,000,000	300,000	10	*	....	....	....	270,000	May.	1884	.10
29	Central, C.....	Mich	500.00	20.000	25	100,000	Sept	1861	.06	1,950.000	Feb.	1890	1.00
30	Chrysolite, S. L.... .	Colo.	10,000,000	200,000	50	*	....	....	....	1,650,000	Dec	1884	.25
31	Colorado Central, S. L.	Colo.	2,750,00	275,000	10	*	....	....	....	406,250	Aug.	1889	.05
32	Confidence, S. L.....	Nev.	.....	34,000	....	306,160	Mar.	1890	.75	199,580	Apl.	1889	1.00
33	Cons. Cal. & Va., G. S.	Nev.	21 600 000	216.000	100	108,000	Jan.	1885	.20	3,465,800	Apl.	1890	.25
34	Contention, S.....	Ariz.	12,500,000	250,000	50	.....	....	....	....	12,587,500	Dec.	1884	.25
35	Cop. Queen Cons, C.	Ariz.	1,400 00	140,000	10	.....	....	....	....	210,000	Feb.	1889	.50
36	Crescent, S. L. G. ...	Utah	15,000,000	600,000	25	*	....	....	....	228,000	Oct.	1888	.03
37	Crown Point, G. S.. .	Nev.	10 000 000	100,000	100	2,880,000	Sept	1889	.50	11,588 000	Jan	1875	2.00
38	Daly, S. L.....	Utah	3,000,000	150,000	20	*	....	....	....	1,612 500	Aug	1890	.25
39	Deer Creek, C. G.....	Idan.	1 000,000	200,00.	5	*	....	....	....	9,000	Jun.	1889	.05
40	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*	....	....	....	11,000,000	Nov.	1887	.10
41	Derbec B. Grav., G. S.	Cal..	10,000,000	100,000	100	90,000	Dec.	1881	.10	210.000	Oct	1889	.10
42	Dunkin, S. L.....	Colo.	5,000,000	200 000	25	*	....	....	....	390,000	Oct	1889	.05
43	Dunstone, G. S. L....	Mont	1,000,000	200,000	5	*	....	....	....	6,00	Nov	1888	.03
44	Eclipse.....	Colo.	1,00 000	100,000	1	*	....	....	....	20,000	Nov.	1887	.10
45	Elkhorn, G.....	Mont	1,000,000	100,000	10	50,000	July	1883	.50	850,000	July	1887	.05
46	Empire Lt., G.....	Mont	500,000	100,000	5	*	....	....	....	70,500	Oct.	1887	.37½
47	Eureka Con., G. S. L.	Nev..	5,000,000	50,000	100	550,000	Jun.	1889	.50	4,980,000	Sept	1890	.25
48	Evening Star, S. L....	Colo.	500,000	50,000	10	*	....	....	....	1,45 .00	Dec.	1889	.25
49	Excelsior, G.....	Cal..	10,000,000	100,000	100	560,000	Sept	1885	1.00	875,000	Oct.	1880	.25
50	Father de Smet, G....	Dak.	10,000,000	100 000	100	200,000	Nov	1878	1.00	1,125,000	Dec	1885	.20
51	Franklin, C.....	Mich	1,000,000	40,000	25	220,000	Jun.	1871	.....	930,00	Jan.	1889	2.00
52	Freeland, G. S. C....	Colo.	5,000,000	200,000	25	*	....	....	....	190,000	May	1886	.10
53	Garfield Lt., G. S....	Nev.	500,000	100,000	5	.....	....	....	....	95,000	Apl.	1888	.12½
54	Gould & Curry, G. S.	Nev..	10,800,000	108,000	100	4,465,500	Apl.	1890	.30	3,826,800	Oct.	1870	10.00
55	Grand Prize, S.....	Nev..	10,000,000	100,000	100	715,000	Nov.	1889	.30	525,000	Jan	1880	.30
56	Granite, S. L.....	Idah.	500,000	500,000	1	*	....	....	....	28.4 .0	Oct.	1889	.02
57	Granite Mountain, S.	Mont	10,000,000	400,000	25	*	....	....	....	9,200.00	Apl	1889	.50
58	Green Mountain, G....	Cal..	1,250,000	125,000	....	.....	....	....	....	212,000	Nov.	1881	.07½
59	Hale & Norcross, G. S	Nev.	11,200,000	112,000	100	5,086,000	July	1887	.50	1,102,000	July	1888	.50
60	Hecla Con., S. G. L. C.	Mont	1,500,000	30,000	50	.....	....	....	....	1,500,000	Apl	1889	.50
61	Hel'a Mg & Red, S. L.	Mont	3,315,000	663,000	5	*	....	....	....	197,97 .0	July	1886	.06
62	Holmes, S.....	Nev.	10,000,000	100,000	100	325,000	Mar.	1890	.25	75,000	Apl.	1886	.25
63	Holyoke, S.....	Idahr	2,000,000	200,000	....	.....	....	....	....	27.00	Feb	1883	.10
64	Homestake, G.....	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	5,581,250	Aug.	1890	.10
65	Honorine, S. L.....	Utah	500,00.	250,000	2	37,500	Apl.	1889	.06	125.00	Sept	1887	.05
66	Hope, S.....	Mont	1,000,000	100,000	10	*	....	....	....	233,252	Apl.	1888	.25
67	Horn-Silver, S. L....	Utah	10.000.000	100.000	25	*	....	....	....	4,150,000	Jun.	1890	.12½
68	Hubert, G.....	Colo.	1,000,000	1 mil'n	1	*	....	....	....	247.00	Dec.	1889	.00½
69	Idaho, G.....	Cal	311,00	3,100	100	.....	....	....	....	5,235,900	Dec.	1888	5.00
70	Ideal, S. L.....	Colo.	1,500,000	50,000	10	*	....	....	....	15.000	Oct.	1886	.05
71	Illinois, S....	N. M.	100,000	100,000	1	*	....	....	....	55,000	Apl.	1889	.20
72	Independence, S.....	Nev..	10,000,000	100,000	100	340,000	Oct.	1886	.20	225.000	Sept	1879	.25
73	Iron Hill, S.....	Dak.	2,500,000	250,000	10	134,000	Jaly	1889	.03	156,250	Nov	1887	.07½
74	Iron-Silver, S. L....	Colo.	10,000,000	500,000	20	*	....	....	....	2,500.000	Apl.	1889	.20
75	Jackson, G. S.....	Nev.	5,000,000	50,000	100	237,500	Nov	1880	.20	55,000	Jun	1889	.10
76	Jay Gould, S.....	Mont	2,000,000	40,000	....	.....	....	....	....	459,000	May	1890	.04
77	Jocusitita, S.....	Mex.	2,500,000	250,000	10	.....	....	....	....	1,200,000	Feb.	1889	.50
78	Jumbo, G.....	Colo	2,000,000	200,000	10	*	....	....	....	35.000	Oct.	1887	.02½
79	Kearsarge, C.....	Mich	1,250,000	50,000	25	190,000	Oct.	1887	1.00	100,000	Jan.	1890	2.00
80	Kentuck.....	Nev.	3,000,000	30,000	100	369,000	Dec.	1889	.30	1,350,000	Dec.	1886	.10
81	La Plata, S. L.....	Colo.	2,000,000	200,000	10	*	....	....	....	610,000	Sept	1882	.30
82	Leadville Cons., S. L.	Colo.	4,000,000	100,000	10	*	....	....	....	4423,000	Apl.	1889	.05
83	Lexington, G. S.....	Mont	4,000,000	40,000	100	*	....	....	....	695,000	Jan.	1886	2.00
84	Little Chief, S. L....	Colo.	10,000,000	200,000	50	*	....	....	....	810,000	Jan.	1890	.05
85	Little Pittsburg, S. L	Colo.	20.000.000	200,000	100	*	....	....	....	1,050.000	Mch.	1889	.50
86	Little Rule..... ..	Utah	500,000	500,0.0	....	.....	....	....	....	30,000	Jun.	1890	.02
87	Mammoth.....	Utah	.....	.....	1	.....	....	....	....	480.000	Aug.	1890	.10
88	Martha Wilde, S.....	Nev.	10,000,000	100,000	100	100,000	Feb.	1890	.25	140.000	Dec	1886	.25
89	Mary Murphy, G. S....	Colo.	350,000	3,500	100	*	....	....	....	120,000	May	1888	5.00
90	Matchless, S.....	Colo.	500.000	500,000	1	*	....	....	....	15,000	Feb.	1890	.00½
91	May Mazeppa.....	Colo.	1,000,000	100,000	1	*	....	....	....	20,000	Aug	1890	.01
92	Minnesota, C.....	Mich	1,000,000	40,000	25	420,000	Apl.	1886	1 00	1,824,000	Mar.	1876	....
93	Mono, G.....	Cal..	5,000,000	50,000	100	102.850	Nov.	1889	.25	12.50	Mar.	1886	.25
94	Montana, L. G. S.....	Mont	3,300,000	660,000	5	*	....	....	....	3,515,300	Aug.	1890	.06
95	Morning Star, S. L....	Colo.	1,000,000	100,000	10	*	....	....	....	850,000	Dec.	1889	.20
96	Moulton, S. G.....	Mont	2,000,000	400,000	5	*	....	....	....	380,000	Dec.	1887	.07½
97	Mount Pleasant, G....	Cal.	150,000	150,000	1	*	....	....	....	150,000	Feb.	1887	.30
98	Mt. Diablo, S.....	Nev.	5,000,000	50,000	100	137,500	Jun.	1880	2.00	160,000	Oct	1889	.20
99	Napa, Q	Cal..	700,000	100,000	7	.....	....	....	....	370,000	July	1890	.10
100	Navajo, G. S.....	Nev..	10,000,000	100,000	100	485,000	Apl.	1888	.30	365,000	Apl.	1889	.10
101	New Guston, S.....	Colo.	500,000	500,000	....	.....	....	....	....	337,500	Apl	1890	.50
102	N. Hoover Hill, G. S.	N. C.	300,000	120,000	2½	*	....	....	....	50,000	Dec.	1885	.06¼
103	Northern Belle, S....	Nev..	5,000,000	50,000	100	425,000	Jan.	1884	8.00	2,400,000	Apl.	1883	.50
104	North Belle Isle, S....	Nev..	10,000,000	100,000	100	400,000	Sept	1889	.20	230,000	May	1888	.50
105	North Star, G.....	Cal..	1,000,000	100,000	10	.....	....	....	....	250,000	Dec.	1889	.50
106	Ontario, S. L.....	Utah	15,000,000	150,000	100	.....	....	....	....	11,225.00	Aug.	1890	.10
107	Ophir, G. S.....	Nev.	10,000,000	100,000	100	4,159,440	May	1889	.50	1,965,800	Aug	1882	1.00
108	Original, S. C.....	Mont	1,500,000	60,000	25	*	....	....	....	123.000	July	1888	.05
109	Oro.....	Colo.	.....	.....	....	.....	....	....	....	60.000	Jun.	1890	.20
110	Osceola, C.....	Mich	1,250,000	50,000.	25	480,000	Apl.	1876	1.60	1,372,500	Sept	1880	1.00
111	Oxford, G.....	N. S.	125,000	125,000	1	*	....	....	....	75,50	Sept	1888	.02
112	Paradise Valley, G. S	Nev.	10,000,000	100,000	100	57,000	Apl.	1888	.15	150,000	Apl	1887	.10
113	Parrot, C.....	Mont	1,800,000	180,000	100	.....	....	....	....	642,000	Jun	1890	.03
114	Peacock, S. G. C.....	N. M.	2,000,000	200,000	10	.....	....	....	....	60,000	Nov.	1886	....
115	Plumas Eureka, G.....	Cal..	1,400,250	140,625	10	*	....	....	....	2,548,046	Oct.	1889	.37½
116	Plutus, G. S. C. L....	Colo.	2,000,000	200,000	10	*	....	....	....	20,000	Feb.	1886	.10
117	Plymouth Con., G.....	Cal..	5,000,00	100,000	50	*	....	....	....	2,280,000	Feb.	1885	40
118	Quicksilver, pref., G.	Cal..	4,350,00.	43,000	100	.....	....	....	....	1,705,781	Aug.	1890	1.50
119	Quicksilver, com., G.	Cal..	5,700,00.	57,000	100	.....	....	....	....	643.367	July	1882	.40
120	Quincy, C.....	Mich	1,000,000	40,000	25	200,000	Dec.	1862	....	5,570,000	Aug	1890	5.00
121	Republic, C.....	Mich.	5,000,000	100,000	50	400,000	Dec.	1889	.30	4,312,587	Jun	1887	1.25
122	Richmond, S. L.....	Nev..	1,350,00	54,000	25	.....	....	....	....	99,785	Feb.	1880	.50
123	Ridge, C.....	Mich.	500,00.	20,000	25	219,939	Mar	1886	.50	885,000	Mar.	1886	.05
124	Robinson Con., S. L..	Colo.	10,000,000	200,000	50	*	....	....	....	100,000	Dec.	1882	.50
125	Robert E. Lee, S. L..	Colo	10,000,00.	600,000	20	*	....	....	....	4,460,000	July	1888	3.00
126	Savage, S.....	Nev..	11,200,000	112,000	100	6,542,000	July	1889	.50	7,50.	Apl.	1883	.01
127	Shosnone, G.....	Idah.	150,000	150,000	....	.....	....	....	....	1,564,145	Apl.	1888	.12½
128	Sierra Buttes, G.....	Cal..	2,225 000	122,500	10	*	....	....	....	102,000	Jan.	1871	1.00
129	Sierra Nevada, G. S.	Nev..	10,000,000	100,000	100	6,250,000	Oct.	1889	.50	270,000	Apl.	1859	.10
130	Sierra Nevada, S. L..	Idaho	1,000,000	1	1	*	....	....	....	40,000	May	1889	.02
131	Silver Cord, G. S. L..	Colo.	4,500,00.	450,000	10	.....	....	....	....	270,000	Apl	1889	.10
132	Silver King, S.....	Ariz.	10,000,000	200,000	50	*	....	....	....	1,950,000	July	1887	.25
133	Silver Mg. of L. V..	N. M.	500,000	500,000	100	80,000	Jan.	1890	.30	150 000	Aug.	1890	.05
134	Silverton, G. S. L....	Colo.	2,000,00.	200,000	10	*	....	....	....	50,000	Jan	1881	25
135	Small Hopes Cons., S	Colo.	5,000,000	250,000	20	*	....	....	....	3,137,50.	Jun	1889	.10
136	Spring Valley, G.....	Cal..	200,00.	200,000	1	50,000	Oct.	1886	.25	3,995,000	Jun.	1888	.05
137	Standard, G. S.....	Cal..	10.000.00	100,000	100	50,000	Feb.	1890	.25	155,000	Nov.	1881	.05
138	Stormont, S.....	Utah	500,00.	500,000	1	*	....	....	....	844.00.	Dec.	1887	.20
139	St. Joseph, L.....	Mo..	1,500,00.	150,000	....	.....	....	....	....	9,000	Apl.	1888	.02½
140	Swansea, G.....	Colo.	600,00.	60,000	10	*	....	....	....	100,000	Nov.	1881	.20
141	Tamarack, C.....	Mich.	1,000,00	40,000	25	520,000	Apl.	1885	3.00	1,56 .000	July	1890	3.00
142	Tombstone, G. S. L..	Ariz.	12,500,00.	500,000	25	*	....	....	....	1,250,000	Apl.	1882	.10
143	United Verde, C.....	Ariz.	3,000,00.	300,000	10	*	....	....	....	9 .000	Feb.	1884	.20
144	Valencia, G. S.....	N. M.	150,00.	1,500	100	*	....	....	....	41 250	Apl.	1886	2.50
145	Viola Lt., S. L.....	Idah.	750,000	150,000	5	.....	....	....	....	272,500	Oct.	1887	.37½
146	Ward Cons., S. L....	Colo.	2,000,000	200,000	10	.....	....	....	....	30,000	Dec.	1889	.05
147	Yankee Girl	Colo.	2,500,000	250,000	10	.....	....	....	....	1,975.00	July	1887	.10
148	Yellow Jacket, G. S.	Nev..	12,000,000	120,000	100	5,508,000	Mar.	1889	.50	2,184,0 .0	Aug	1871	1.50
149	Webb City, L. Z.....	Mo..	55,000	11,000	5	.....	....	....	....	4,400	July	1889	.10
150	Woodside.....	Utah	.....	.....	....	.....	....	....	....	25,000	Oct.	1889	.25
151	Young America.....	Cal..	.....	.....	....	.....	....	....	....	175,000	....	1889	.10

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par Value.	Assessments. Total levied	Date & amount of last.		
1	Agassis Cons., s. L..	Colc.	$2,500,000	50,000	$50	*	....	....	....
2	Allegheny, S.....	Colo.	5,000,000	50 .,000	10	.....	....	....	....
3	Alliouez, C.....	Mich	2,000,000	80,000	25	$737.000	Jan.	1890	7
4	Alpha Con., G. S....	Nev..	3,000,000	30,000	100	5 8,750	July	1889	.50
5	Alta, S.....	Nev.	10,080,000	100,800	100	2,248,800	Sept	1888	.50
6	Amador, G.....	Cal..	400,000	200,000	2	*	....	....	....
7	American Flag, S....	Colo	1,250,000	125,000	10	300,000	Jun	1877	....
8	Amity &	Colo.	250,000	250,000	1	.....	....	....	....
9	Anglo-Montana, Lt.	Mon.	600,000	120,000	5	*	....	....	....
10	Astoria, G.....	Cal..	200,000	100,000	2	.....	....	....	....
11	Barcelona, G.....	Nev..	5,000,000	200,000	25	*	....	....	....
12	Bechtel Con., G....	Cal..	10,000,000	100,000	100	173,500	Jan.	1883	.10
13	Belmont, S.....	Nev..	5,000,000	50,000	100	735.000	Apl.	1886	.10
14	Best & Belcher, G. S.	Nev.	10,080,000	100,800	100	2,180,590	Jan.	1890	.25
15	Big Pittsburg, S. L..	Colo.	20,000,000	200,000	100	*	....	....	....
16	Bi-Metallic, S.....	Mon.	5,000,000	200,000	25	*	....	....	....
17	Black Oak, G.....	Cal..	3,000,000	300,000	10	*	....	....	....
18	Boston Con., G.....	Cal..	10.000.000	100,000	100	170,000	Nov	1883	.25
19	Bremen, S.....	N. M.	5 000,000	500,000	10	*	....	....	....
20	Brownlow, S.....	Colo.	250,000	250,000	1	.....	....	....	....
21	Brunswick, G.....	Cal..	2,000,000	400,000	5	*	....	....	....
22	Bullion, G. S.....	Nev.	10.000.000	100,000	100	4,007,000	Aug.	1888	.50
23	Calaveras, G.	Cal..	500,000	500,000	1	*	....	....	....
24	Carisa, G	Wy	500.000	100,000	5	*	....	....	....
25	Carupano, G. & L. C.	Ven.	200,000	100,000	2	*	....	....	....
*	Carson, G.....	Colo.	500,000	250,000	2	*	....	....	....
27	Charles Dickens, G.&	Idah.	1,250,000	250,000	5	*	....	....	....
28	Cherokee, G.....	Cal..	1,500,000	150,000	10	.....	....	....	....
29	Chollar, S.....	Nev..	11,200,000	112,000	100	1,484,000	July	1889	.50
30	Cleveland, T.....	Dak.	1,000,000	500.000	2	*	....	....	....
31	Colchis.....	N. M.	500,000	50.000	10	.....	....	....	....
32	Commonwealth, S....	Nev.	10,000 ,00.	100,000	100	170,000	Nov	1889	.50
33	Comstock, G. S.....	Nev..	10,000,000	100,000	100	30 000	Mar.	1887	.15
34	Con. Imperial, G. S..	Nev..	5,000,000	50,000	100	1,802,50.	Nov.	1889	05
35	Con. Pacific, G.. ..	Cal..	6,000 00	60,000	100	192,000	Oct.	1889	.10
36	Cons Silver, S.....	Mo...	2,500,000	250,000	10	*	....	....	....
37	Crescent, S. L.....	Colo.	3,000,000	300,000	10	*	....	....	....
38	Crocker, S.....	Ariz.	10,000,000	100,000	100	135,000	Jan.	1890	.10
39	Crowell, G.....	N. C.	500,000	500,000	1	.....	....	....	....
40	Dahlonega, G.....	Ga..	250,000	250,000	1	*	....	....	....
41	Dandy, S.....	Colo.	5,000,000	500,000	10	*	....	....	....
42	Decatur, S.....	Colo.	1,500,000	300,000	5	*	....	....	....
43	Denver City, S. L ..	Colo.	5,000,000	500,000	10	*	....	....	....
44	Denver Gold, G.....	Colo.	300,000	60,000	5	*	....	....	....
45	Durango, G.....	Colo.	500,000	500,000	1	*	....	....	....
46	Eastern Dev. Co., Lt.	N. S.	1,500,000	150 000	10	990,000	Mar.	1886	1.00
47	El Cristo, G. S.....	U.S.C	1,000,000	500,000	2	*	....	....	....
48	El Dorado, G.....	Cal..	1,000,000	250,000	4	*	....	....	....
49	El Talento, G.....	U.S.C	1,000,000	500,000	2	.....	....	....	....
50	Empire, S.....	Utah	10,000,000	100,000	100	*	....	....	....
51	Eureka Tunnel, S. L.	Nev..	10,000,000	100,000	100	*	....	....	....
52	Exchequer.....	Nev.	10,000,000	100,000	100	515,000	Apl.	1889	.25
53	Found Treasure, G.S.	Nev..	10,000,000	100,000	100	30,530	Apl.	1889	2½
54	Gogebic I. Syn., I..	Wis.	5,800,000	200,000	25	*	....	....	....
55	Gold Cup, S.....	Colo.	500,000	500,000	1	*	....	....	....
56	Golden Era, S.....	Mon.	2 000,000	200,000	10	*	....	....	....
57	Gold Placer, G.....	Colo.	5,000,000	200,000	25	229,314	Dec.	1886	.25
58	Gold Run, G.....	Colo.	1,000,000	200,000	5	*	....	....	....
59	Goodshaw, G.....	Cal..	10,000,000	100,000	100	*	....	....	....
60	Grand Belt, C.....	Tex.	12,000,000	120,000	100	.....	....	....	....
61	Grand Duke.....	Colo.	800,000	80,000	10	.....	....	....	....
62	Great Remance, G...	U.S.C	1,000,000	500,000	2	*	....	....	....
63	Gregory-Bobtail, G..	Colo.	550,000	550,000	1	*	....	....	....
64	Gregory Con., G.....	Mon.	3,000,000	300,000	10	*	....	....	....
65	Harlem M. & M. Co.G.	Cal.	1 000,000	200,000	5	*	....	....	....
66	Head Cent. & Tr. S.G.	Ariz.	10,000,000	100,000	100	.....	....	....	....
67	Hector, G.....	Cal..	1,500,000	300,000	5	45,000	Jan.	1889	.15
68	Highland, C.....	Mich	500,000	25,000	20	*	....	....	....
69	Hollywood.....	Cal..	200,000	100,000	2	*	....	....	....
70	Hortense, S.....	Colo.	2,000,000	200,000	10	*	....	....	....
71	Huron, C.....	Mich	1,000,000	40,000	25	280,000	May	1887	3.00
72	Iron Gold & Silver, S	N. M.	2,000,000	200,000	10	*	....	....	....
73	Ironton, I.....	Wis.	1,000,000	40.000	25	*	....	....	....
74	Iroquois, C.....	Mich	1,250,000	50,000	25	.....	....	....	....
75	J. D. Reymert.....	Ariz.	10,000,000	100,000	100	.....	....	....	....
76	Julia Cons., G. S....	Nev..	11,000,000	110,000	100	1,660,000	Jan.	1889	.10
77	Lacrosse, C.....	Colo.	1,000,000	100,000	10	*	....	....	....
78	Lee Basin, S. L.....	Colo.	5,000,000	500.000	10	*	....	....	....
79	Mayflower Gravel...	Cal..	1,000,000	100,000	10	585,000	Mar.	1890	.56
80	Medora, G..... ..	Dak.	250,000	250,000	1	.....	....	....	....
81	Mexican, S. S.....	Nev.	10,000,000	100,000	100	2,800,760	Dec.	1889	.25
82	Middle Bar G.....	Cal..	400,000	200,000	2	*	....	....	....
83	Mike & Starr, S. L...	Colo.	1,000,000	200,000	5	*	....	....	....
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NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Aug. 23.		Aug. 25.		Aug 26.		Aug. 27.		Aug. 28		Aug. 29		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Ad ms	.....	.....	..	....	....	....	....	....	....	....	....	....	.....
Argenta, Mich	....	.....	....	....	....	....	.12	....	....	....	....	....	500
Atla tic, Mich	....	.. ..	....	....	....	....	....	..	24.63	....	....	....	100
Belcher Nev	....	.. ..	....	....	....	....	....	....	....	....	....	....	.....
Bodie Cons., Cal	....	.....	....	....	60.75	....	....	....	....	....	....	....	150
Bos. & Mont., Mont	69.50	.....	....	....	....	....	....	....	....	....	....	....	.....
Breece, Colo	....	.....	....	....	.30	.29	.30	....	.30	....	....	....	1,200
Bulwer, Cal	....	.. ..	....	....	....	....	2 00	....	....	....	....	....	200
Caledonia	....	.....	....	....	30½	.30	....	....	....	....	30¾	....	40
Calumet & Hecla	300½	.....	.30	....	.31	.30	....	....	.35	.30	.39	.35	5,100
Chrysolite	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Colorado Central	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Confidence, Nev	....	.....	....	....	....	....	5 13	....	4.90	....	....	....	300
Cons. Cal. & Va., Nev	3 00	.....	....	....	2.75	....	2.80	....	..	....	2 90	....	500
Crown Point, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Deadwood, Dak	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Dunkin, Colo	....	....	5.00	....	5 00	....	5.50	....	....	....	....	....	400
Eureka Con	25.88	....	..	..	....	....	....	....	....	....	25.75	....	90
Franklin	.40	.38	.40	.38	.40	.39	.39	....	.39	....	.39	.38	12,000
Freeland, Colo	2 50	..	....	....	2.30	....	2.60	....	2.5	....	2.5	....	00
Gould & Curry, Nev	....	..	....	....	2.75	....	3.00	....	....	....	....	....	200
Hale & Norcross, Nev	....	..	....	....	....	....	....	....	....	....	....	....	.....
Holyoke	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Homestake, Dak	..	.....	....	....	....	....	....	....	....	....	....	....	.....
Horn Silver, Ut	....	.....	3 60	....	3.70	3.60	3 65	3.60	3.60	....	....	....	1,200
Ind pendence, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Iron Silver	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Kearsarge	18.25	.....	....	....	....	....	....	....	....	....	....	....	10
Le uville C., Colo	....	.....	.15	.13	.15	.14	.14	....	.14	....	.15	....	20.200
Little Chief, Colo	....	.....	.51	.45	.47	....	.55	.49	.60	.52	.61	.58	12,300
Martin White, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Mono, Cal	.65	.....	....	....	....	....	.70	....	.65	....	.65	....	1,100
Navajo Nev	....	.....	....	....	....	....	.50	....	....	....	....	....	100
N. Belle Isle, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Ontario, Ut	....	.....	....	....	45 50	45.00	....	....	....	....	....	....	170
Ophir, Nev	5 00	....	..	..	4.85	....	....	....	5.13	....	5.33	....	400
Osceola, Mich	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Plymouth, Cal	....	.. ..	....	....	....	....	4.00	....	3.50	....	....	....	170
Quicksilver, Pref	....	.. ..	....	....	43.50	....	....	....	....	....	....	....	100
" Com	8.50	....	888	8.38	9.25	8.88	8.75	....	....	....	8.88	8.75	3,500
Quincy, Mich	1.69¾	....	....	....	....	....	....	....	....	....	....	....	20
Robinson Cons. Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Savage	4.20	.....	....	....	....	....	....	....	4.25	....	....	....	200
Sierra Nevada, Nev	....	.....	....	....	2.85	....	....	....	3.00	....	3.10	....	300
Silver Cord	....	.....	....	....	....	....	.35	....	....	....	....	....	300
Silver King, Ariz	....	.....	....	....	....	....	.50	....	....	....	....	....	100
Silver Mg. of L. V	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Small Hopes	....	....	....	....	....	....	.0	....	90	.98	....	....	700
Standard	....	....	1.00	70	1.00	.85	1,00	....	1 20	1.0	1. 20	....	2,200
Stormont, Utah	....	.....	....	..	....	....	....	....	.08	.06	10	....	1,000
Tamarack, Mich	21¾	.....	....	....	....	....	....	....	....	....	210¼	....	25
Yellow Jacket, Nev	....	.....	....	....	3.40	....	....	....	....	....	3.3	....	500

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Aug. 23.		Aug. 25		Aug. 26.		Aug. 27		Aug. 28		Aug. 29		SALES.
	H.	L.	H.	L.	H.	L.	H	L.	H.	L.	H.	L.	
Alpha, Nev	....	..	....	....	....	....	1.60	....	....	....	....	....	100
Alta, Nev	1.25	....	1.20	.....	1.20	...	1.30	....	1 20	....	1 20	....	800
Andes, Nev	....	..	....	....	....	....	.85	....	....	....	1.30	....	300
Amador, Cal	....	..	....	....	....	....	....	....	....	....	....	....	.....
Astoria, Cal	....	..	....	....	....	....	.04	....	.09	.04	.09	.08	12,700
Barcelona, Nev	....	..	....	....	....	....	....	....	.32	.20	.31	.29	600
Best & Belcher, Nev	2.60	....	....	....	3.45	....	3.65	....	3.50	....	3.80	....	550
Bonanza King, Cal	....	..	....	....	....	....	....	....	....	....	....	....	.....
Brunswick, Cal	.10	....	.11	.09	.11	.10	1 0	....	.11	.10	.13	.11	25,800
Bullion, Nev	....	..	....	....	3.90	..	3.90	....	....	....	3. 0	....	300
Eutte & Bost, Mont	....	..	....	....	....	....	....	....	....	....	....	....	.....
Castle Creek, Id	....	..	....	....	....	....	....	....	....	....	....	....	.....
Choilar, Nev	....	..	....	....	3 15	....	3.40	....	3.30	....	3.50	....	450
Col. & Beaver, Id	....	..	....	....	....	....	....	....	....	....	....	....	.....
Commonw. Nev	2.75	....	....	....	2 00	....	2 90	....	3.10	..	3.15	....	530
Comstock T., Nev	....	..	.17	..	....	....	....	....	....	....	.18	....	700
" bonds	....	..	....	....	....	....	.24½	....	....	....	....	....	1,000
" scrip	....	..	....	....	....	....	....	....	....	....	....	....	.....
Con. Imperial, Nev	....	..	....	....	....	....	....	....	....	....	....	....	.....
Denver City, Colo	....	..	....	....	....	....	....	....	....	....	....	....	.....
El Cristo, Rep. of Col	....	..	.80	....	.85	.80	.85	....	.85	.75	....	....	900
Exchequer	....	..	....	....	.9	....	1.10	....	....	....	1.25	....	6 00
Hollywood, Cal	....	..	....	....	....	....	....	....	.02	....	....	....	2,000
Huron, Mich	7.63	....	..	....	7.75	....	....	..	8.25	....	7.88	....	400
Julia, Nev	.40	....	....	....	.41	....	.43	....	.40	....	.25	....	2,100
Kingst'n & Pemb'ke	....	..	....	....	....	....	....	....	....	....	....	....	.....
Kossuth	....	..	....	....	....	....	....	....	....	....	....	....	.....
Lacrosse, Colo	....	..	....	....	....	....	....	....	....	....	.08	.06	5,600
Lee Basin, Colo	....	..	....	....	....	....	....	....	....	....	....	....	.....
Mexican, Nev	3.50	....	3.55	....	3.35	....	....	....	....	....	3.50	....	400
Minn Iron Co., Mich	....	..	....	....	....	....	....	....	....	....	....	....	.....
Moniter	....	..	.02	....	....	....	....	....	....	....	....	....	.....
Mutual Sm. & M. Co	1.55	....	1.60	1.20	1.30	....	1.35	....	1.35	....	....	....	1,000
Nevada Queen, Nev	....	..	....	....	1.10	....	....	....	....	....	....	....	1,300
N. Com'nw'th, Nev	....	..	....	....	....	....	....	....	....	....	....	....	100
Occidental, Nev	....	..	....	....	....	....	....	....	....	....	....	....	.....
Oriental & Mil., Nev	....	..	....	....	....	..	....	..	....	....	.08	.04	1,100
Overman, Nev	....	..	....	....	....	....	2.50	....	....	....	....	....	1 0
Phœnix of Ariz	1.15	1.10	1.20	1.05	1.15	1.10	1.15	1 00	1 75	1.00	1 20	1.15	12,400
Potosi, Nev	7.13	....	....	....	6.75	....	....	....	7.00	....	....	....	170
Rappahann'k, Va	.05	....	.08	.07	.07	....	....	....	....	....	.07	....	4,800
Santa Fe, Ariz	....	..	....	....	....	....	....	....	....	....	....	....	.....
Santiago, U. S. C	....	..	....	....	....	....	....	....	....	....	....	....	.....
S. Sebastian	.45	....	....	....	....	....	....	....	....	....	....	....	.....
Scorpion	....	..	....	....	.35	....	.40	....	....	....	.35	....	200
Shoshone	....	..	....	....	....	....	....	....	....	....	....	....	600
Silver Hill	....	..	....	....	45	....	.40	....	....	....	.40	....	.....
Silver Queen	....	..	....	....	....	....	....	....	....	....	06	....	900
Sullivan Con., Dak	1.00	....	1.00	..	1.00	....	1 00	....	1.00	....	1.00	....	100
Sutro Tunnel, Nev	....	..	....	....	....	....	....	....	....	....	....	....	2,400
Sutter Creek, Cal	1.15	....	1.20	....	1.25	1.20	1.35	1 25	1.35	....	1 40	1.35	3,700
Union Cons., Nev	....	..	....	....	....	....	3 10	....	....	....	3 15	....	2 0
Utah, Nev	.90	....	.90	....	.85	....	95	....	.85	....	.90	....	1,700

*Ex dividend. †Dealt in at the New York Stock Ex. ‡Unlisted Securities §Assessment paid. ‖Assessment unpaid. ¶Omited July 18. Dividend shares sold, 66,805, Non-dividend shares sold, 5,000. Total New York, 151,805.

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	Aug 22.		Aug. 23.		Aug. 25.		Aug. 26.		Aug. 27.		Aug. 28.		SALES.
Atlantic, Mich	23 50	23 00	23.00	....	24 13	23.75	....	....	24 75	24 50	24 63	24.00	1,330
Bodie, Cal	....	.. ..	....	....	....	....	....	....	....	....	....	..	....
Bonanza Developm't	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Bost. & Mont., Mont	59.25	58 25	60.25	59 88	61 00	60 00	61.25	60.50	60 50	58 50	....	..	2,357
Breece, Colo	48	.45	....	....	.50	46	....	....	....	....	....	..	900
Calumet & Hecla, Mich	305	300	3 9	307	309	308	310	308	309	....	309	308	185
Catalpa, Colo	.45	..	....	....	.60	.40	....	....	.45	.44	....	..	1,550
Central, Mich	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Chrysolite, Colo	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Con. Cal. & Va., Nev	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Dunkin, Colo	....	.. ..	....	....	.60	....	.60	....	.60	....	....	..	1,000
Eureka, Nev	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Franklin, Mich	25 50	25.00	26.00	25.00	26.50	26.00	26.00	25 75	25 88	25 75	25.50	25.00	1,343
Honorine, Utah	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Hoosac Silver, Utah	....	.. ..	....	....	3 40	....	....	....	....	....	....	..	20
Kearsarge	19.00	18.00	20.50	19 00	21.25	20 5	20 50	19 13	20.00	19 00	....	..	2,620
Little Chief, Colo	.39	.. ..	....	....	.49	.44	.52	.50	....	....	....	..	2,800
Little Pittsburg, Colo	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Moulton	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Napa, Cal	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Ontario, Utah	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Osceola, Mich	42 00	41.50	43.50	42.75	44.75	43.00	45.25	44 75	45 25	44.00	46 00	45 25	2,872
Pewabic, Mich	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Quincy, Mich	....	.. ..	....	....	129	....	130	127	....	....	129	....	145
Ridge, Mich	....	.. ..	....	....	1.25	1.00	....	....	....	....	....	..	100
Sierra Nev., Nev	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Silver King	....	.. ..	....	....	....	....	....	....	....	....	....	..	.....
Stormont, Utah	.66	.. ..	....	....	....	....	....	....	....	....	....	..	300
Tamarack, Mich	212	210	213	212	212	....	210	....	211	210	..	..	228

NAME OF COMPANY.	Aug. 22.		Aug 23.		Aug. 25.		Aug. 26		Aug. 27.		Aug. 28.		SALES.
Alloues, Mich	8.75	8 50	9 00	8.63	9 00	8.50	9 00	8.88	9 00	8.75	8 75	8 63	4,325
Arnold, Mich	....	....	....	....	2.25	2.00	1.6	....	....	....	....	....	120
Aztec, Mich	.40	....	....	....	....	....	....	....	....	....	....	....	100
Brunswick, Cal	11	....	....	....	....	....	....	.13	....	....	....	....	800
Butte & Bost., Mont	21 0	22 50	22 50	21.50	22 75	2 .50	23 00	22 00	21.88	21 50	22 25	22 00	2,407
Centennial, Mich	25.00	24.75	25.75	24 5	24 25	25.00	25.50	22.00	24 00	21 00	22.50	....	4,680
Comstock, T., Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Copper Falls Mg	....	....	....	....	....	....	....	....	....	....	....	....	.....
Crescent, Colo	.20	.19	....	..	.20	.19	....	....	.19	.18	....	....	2,900
Dana, Mich	.35	....	....	....	....	....	....	....	....	....	....	....	100
Don Enrique, N. M.	....	....	....	....	....	....	....	....	....	....	....	....	.....
El Cristo, S. A	....	....	....	....	....	....	....	....	....	....	....	....	.....
Hanover, Mich	....	....	....	....	....	....	....	....	.38	....	....	....	100
Humboldt, Mich	.60	.48	....	....	.61	.60	.58	....	.60	....	....	....	1,600
Hungarian, Mich	....	....	....	....	....	....	....	....	....	....	....	....	.....
Huron, Mich	7 50	....	....	....	8 00	7.50	8.50	....	8 25	....	....	....	830
Mesnard, Mich	....	....	....	....	....	....	....	....	....	....	....	....	.....
National, Mich	2 25	....	....	....	2 38	2.13	2.25	....	2 25	....	....	....	800
Native, Mich	.23	....	....	....	.23	.22	.23	....	.23	....	....	....	1,020
Oriental & M., Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Phœnix	....	.. ..	....	....	....	....	....	....	....	....	....	....	.....
Pontiac	....	.. ..	....	....	.50	....	....	....	.45	....	....	....	300
Rappahannock, Va	....	....	....	....	....	....	....	....	....	....	....	....	.....
Santa Fe, N. Mex	.55	.50	.58	....	.55	.53	.70	.58	.65	....	....	....	6,200
Shoshone, Idaho	....	....	....	....	....	....	....	....	....	....	....	....	.....
South Side, Mich	....	....	....	....	.25	....	.25	....	.25	....	....	....	9 0
Star	....	....	....	....	....	....	....	....	....	....	....	....	.....
Tecumseh Mg. Co	4.00	....	....	....	....	....	....	....	....	....	....	....	100
Washington, Mich	.3	....	....	....	....	....	.35	....	.35	....	....	....	700

Boston: Dividend shares sold, 17,750. Non-dividend shares sold, 27,982. Total Boston, 45,732.

COAL STOCKS.

NAME OF COMPANY.	Par val. of sh'rs.	Aug. 23.		Aug. 25.		Aug. 26.		Aug. 27.		Aug. 28.		Aug. 29.		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American Coal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cambria Iron	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cameron Coal & Iron Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ches. & O. RR	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chic. & Ind. Coal RR	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. pref	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Col., C. & I	100	.....	.....	49	48⅝	50½	49¾	50⅜	49⅛	50⅛	50	50⅛	....	3,700
Col. & Hocking C. I	100	27¾	27	27⅛	27⅛	27⅛	27¼	27⅛	27⅛	28¾	27¾	29	28	4,700
Consolidation Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Del. & H. C	100	161½	.....	.....	.....	161¾	161	160¾	159¾	.....	.....	162½	.....	1,112
D., L. & W. RR	50	143⅜	142⅝	143¼	142¾	145⅝	143¾	145⅛	143¼	144¾	143¾	145⅜	144	58,280
Hocking Valley	100	29	.....	29	.....	30½	29½	30⅝	30	31⅞	29½	32⅜	31⅝	11,910
Hunt. & Broad Top	..	.....	.....	.....	.....	23⅛	20⅛	22⅞	22	22½	22¼	.....	.....	2,331
Do. pref	.....	.....	.....	.....	.....	47¼	46½	47⅛	.....	47¼	.....	.....	.....	461
Illinois Coal & Coke Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh C. & N	50	.....	.....	51¾	51½	51¼	.....	.....	.....	51¾	51⅜	.....	.....	699
Lehigh Valley RR	50	52¼	52⅛	52⅛	52	52¼	52⅛	52⅜	52¼	52⅛	52¼	...	.....	1,723
Lehigh & Wilkesb. Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mahoning Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marshall Con. Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maryland Coal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morris & Essex	100	.....	.....	.....	.....	150	.....	.....	.....	.....	.....	.....	.....	200
New Central Coal	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. J. C. R.R.	100	.....	.....	122½	121	122	.....	.....	.....	121¼	121	121⅜	.....	1,340
N. Y. & S. Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Y., Susq. & Western	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. pref	100	.....	.....	.....	.....	.....	.....	.....	.....	31	.....	.....	.....	100
N. Y. & Perry C. & I	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norfolk & Western R.R.	50	.....	.....	.....	.....	20	.....	.....	.....	19½	.....	20¼	.....	215
Do. pref	50	62½	.....	.....	.....	64	63½	.....	.....	64	.....	64	.....	1,200
Penn. Coal	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn. RR	50	53¼	.....	53¼	53⅛	53¼	53⅛	53¼	53⅛	53⅛	53¼	.....	.....	2,102
*Ph. & R. RR	.....	42¼	41⅛	41¾	41¼	43	42	42¾	41¼	43⅛	42⅛	43	42⅜	**66,443
Sunday Creek Coal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. pref	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee C. & I. Co	.....	.....	.....	44	.....	.....	.....	45⅛	.....	45½	.....	44	.....	525
Do. pref	.....	.....	.....	.....	.....	.....	.....	.....	.....	96	.....	.....	.....	25
Westmoreland Coal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

**Sales in New York, 24,544; in Philadelphia, 41,899. Total sales, 156,996.

San Francisco Mining Stock Quotations.

COMPANY	CLOSING QUOTATIONS.					
	Aug. 22	Aug. 23.	Aug. 25.	Aug. 26.	Aug. 27.	Aug. 28.
Alpha	.....	.....	.....	.....	.....	.....
Alta	1.15	.....	1.10	1.15	1.05	1.05
Belcher	.....	.....	.....	.....	.....	.....
Belle Isle	1.10	.....	1.10	1.10	1.10	1.10
Best & Bel	3.40	.....	3.30	3.45	3.30	3.70
Bodie	1.25	.....	1.50	1.30	1.35	1.25
Bulwer	.20	.....	.30	.25	.25	.25
Challar	3.30	.....	3.05	3.25	3.20	3.35
C'm'weal'h	2 60	.....	2.80	2.80	3.00	3.05
Con. C. & V	4.75	.....	4 50	4.90	4.70	4.90
Con. Pac	.....	.....	.....	.....	.....	.....
Crown Pt	2.85	.....	2.60	2.65	2.70	2.7
Eureka C	.....	.....	.....	4.50	4.50	4.50
Gould & C	2.35	.....	2.20	2.40	2.35	2.40
Grd. Prize	.....	.....	.....	.....	.....	.....
Hale & N	2.80	.....	2.65	2.85	2.70	2.75
M. White	.....	.....	.....	.....	.....	.....
Mexican	3.40	.....	3.20	3.40	3.30	3.30
Mono	.50	.....	.70	.60	.55	.55
Mt. Diablo	.....	.....	.....	2.60	2.50	2.60
Navajo	.35	.....	.35	.40	.40	.40
Nev. Queen	60	.....	1.00	.80	.85	.80
N. Belle I	1.00	....	1.10	1.05	1.05	1.05
Occidental	.....	.....	.....	.....	.....	.....
Ophir	4.85	.....	4.70	5.25	4.90	5.13
Potosi	7.00	.....	6.38	6.88	6.50	6.25
Savage	4.05	.....	3.90	4.20	4.10	4.10
Sierra Nev	3.05	.....	2.75	3.05	2.85	2.9
Union Con.	3.05	.....	2.85	3.05	2.90	3.00
Utah	.75	.....	.70	.80	.75	.80
Yellow Jkt	3.30	.....	3.30	3.30	3.35	3.30

STOCK MARKET QUOTATIONS.

Baltimore, Md.

COMPANY.	Bid. L. H.	Asked. L. H.
Atlantic Coal	....	$1.50
Balt. & N. C.	....	....
Big Vein Coal	....	....
Conrad Hill	....	....
Cons. Coal	....	....
Diamond Tunnel	28	....
George's Crk. C.	....	....
Lake Chrome	13	35
Maryland & Charlotte	....	....
North State	65	....
Silver Valley	45	50

Prices bid and asked, lowest and highest, during the week ending August 28.

Birmingham, Ala.

COMPANY.	Bid L. H.	Asked. L. H.
Ala. Coal & I. Co.	....	$100
Ala. Copp. C. & C. Co.	....	$23
Ala. R. Mill Co.	$60	....
Alice Furnace	$103	....
Anna Howe fs. Mg. Co.	$⅞	$⅞
Bess'mer Land.	$14½@ $35	$16@$ 6½
Bir. Mg. & M g.	$25	$40
Cahaba Coal Mg Co	....	$70
Camille Gold Mg Co	$½	....
De Bardeleben C. & I. Co.	....	$76
Decat. L. Imp.	$13½@$14	$ 4¼
Decatur Min. L.	....	$22¾
Ensley Land	....	$16@$16¼
Eureka	**$99	$ 2½
Florence L. & Mg. Co.	$21½	$22⅞
Gadsen Land	$ ¾@1⅞	$ ⅛@ ⅝
Hecla Coal Co.	....	$20
Hen. S. & M. Co	$70@$83	$55@ $87½
Jagger-Townly C. & C. Co.	$8¼	$10
Mag-Ellen	$100	....
Mary Lee C. & R. Co.	$20	....
Sheffield C & I. Co	$5 @$53	$55½@$56
Sloss I. & S.	$44	....
†Sloss I. & S.	$92	....
††Sloss I. & S.	....	$79@$80
Tuscaloose C. I. & L. Co	$24	$27
Tenn. C. & I. Co.	....	$45½
" pref.	$100	$105
Vulcan C. & C. Co.	$5	....
Woodstock I Co.	....	$36@$37

Prices, highest and lowest, bid and asked during week ending August 25.

* Bonds. † First mortgage. †† Second mortgage. ** Without interest.

Pittsburg, Pa. Aug. 27.

COMPANY.	B.	A.	Closing
Allegheny Gas Co.	....	....	....
Bridgewater Gas Co.	$59.00@$60.00		$60.00
Chartiers Val. Gas	*41.25	*45.00	*43.25
Columbia Oil Co	....	3.25	3.25
Consolidated Gas Co.	....	....	....
East End E. Light Co.	....	....	....
East End Gas Co	....	....	....
Forest Oil	....	....	....
Hazlewood Oil Co.	....50.00@50.63		50.50
La Noria Mining	.17	.19	.17
Luster Mg. Co.	*29.00	*30.25	*29.50
Mansfield C. & C. Co.	....	....	....
Manufacturers Gas Co.	....	....	....
Nat. Gas Co. of W. Va	....	....	....
N. Y. & Clev. Gas Coal.	31.50	....	31.50
Ohio Valley Gas.	....16.00@17.50		16.00
Pennsylvania Gas	13.25	....	13.25
People's Natural Gas.	....	....	....
People's N. G. & P. Co.	15.85@16.13		16.00
Philadelphia Co.	30.50	31.00	30.88
Pine Run Gas Co	....	....	....
Pittsburg Gas	....	....	....
Silverton Mg. Co.	1.00	....	1.00
South Side Gas.	....	....	....
Tuna Oil Co.	....	....	....
Union Gas.	....	....	....
Washington Oil Co.	....	....	....
W'house Brake Co.	65.00	75.00	70.00
W'house A. B. Co.	....116.00	119.00	116.75
W'house E. Light.	37.00	39.50	38.00
W'moreland & Camb.	....	....	....
Wheeling Gas.	20.00	23.00	2.300
Yankee Girl Mg	....	....	....

* Actual selling price.

Prices bid and asked and sales during week ending August 27:

Chartiers Gas	100 shs.	@$42
Luster Mining	90 "	$30@$30¼
West. Electric	60 "	@$38

St. Louis. Aug. 27.

CLOSING PRICES.

COMPANY.	Bid.	Asked.
Adams, Colo.	$1.65	$1.80
American & Nettie	1.70	1.80
Aztec, N. Mex.	....	....
Bi-Metallic	35.50	....
Central Silver	....	....
Cleveland, Colo.	.05	.05½
Cleveland & An'r.	.15	.20
Coeur d'Alene	.80	....
Elizabeth	....	....
Gold King	....	....
Granite Mountain, Mont.	46.00	46.50
Hope	1.90	....
I. X. L., Colo.	....	....
La Union	.08½	.09
Little Albert	.33¾	.40
Montrose Placer, Colo.	.50	.65
Major Budd, Mont.	.11½	.13
Mexican Imp.	.14½	.15
Mickey Breen	1.12½	1.20
Mountain Key	.52¼	....
Pat Murphy, Colo.	.14½	.15
Puzzle	....	....
Richmond Hill	.36¼	.37½
Samoa	....	....
Silver Age, Colo.	1.42½	1.47½
Small Hopes, Colo.	.81¼	.83¾
Tourtelotte	.03½	.04
West Granite, Mont.	....	1.00
Wire Patch	.15	....
Yuma, Ariz.	....	....

Trust Stocks. Aug. 29.

The following closing quotations are reported to-day by C. I. Hudson & Co., members of New York Stock Exchange:

CERTIFICATES.

Am. Cotton Oil. Tr. Repts.	$24	@$24½
Cattle Trust	13	@ 14½
Distillers' & Cattle Feeders'.	45¾	@ 46
Linseed Oil	49	@ 50
National Lead	215/8	@ 217/8
Standard Oil	165½	@166½
Sugar Refineries.	78¼	@ 78⅝

Sales at the New York Stock Exchange week ending Aug. 29:

	Sales.	Price H.	Price L.
*American Cotton Oil.	16,544	26⅞	23
National Lead	35,505	22	20¼
Sugar	112,431	79⅝	74¾

*Trust receipts.

Foreign Quotations.

London.

COMPANY.	Highest.	Lowest.
Almada, Mex.	1s. 3d.	9d.
Amador, Cal	£15-16	£13-15
Appalachian, N. C.	6d.	3d.
Canadian Phos, Canada.	£⅛	£⅛
Carlisle, N. Mex	3s. 6d.	3s.
Colorado, Colo.	£¼	£⅛
Comstock, Utah	....	....
Cordova	....	....
Cons. Esmeralda, Nev.	2s. 6d.	2s.
Denver Gold, Colo.	6d.	....
Dickens Custer, Idaho.	1s. 3d.	9d.
East Arevalo, Idaho.	2s.	1s.
El Callao, Venezuela	£2½	£¾
Elmore, Idaho	1s. 9d.	1s. 3d.
Empire, Mont	1s. 3d.	9d
Garfield, Nev.	1s 6d.	6d.
Jay Hawk Mont	1s.	6d.
Josephine, Cal	1s 6d.	6d.
Kohinoor, Colo.	2s. 3d	1s. 9d.
La Luz, Mex.	1s. 9d.	1s. 3d.
La Valera, Mexico	1s. 6d.	1s. 6d.
Montana Lt., Mont	19s.	18s.
New California, Colo.	6s 6d.	5s 6d.
New Consolidated	9d.	3d.
New Eberhardt, Nev.	1s. 3d.	9d.
New Emma, S. Utah	4s.	3s. 6d.
New Flagstaff Utah	3s. 3d.	2s. 9d.
Newfoundland, N. F.	3s. 6d.	3s.
N Gold Hill, N. C.	1s 3d.	9d.
New Guston, Colo.	£1⅜	£1⅛
New Hoover Hill, N. C.	1s. 3d.	9d
Old Lout. Colo.	£⅝	£⅛
Palmarejo, Mex	14s 3d.	13s. 9d.
Pinos Altos, Mex	£1⅛	£⅜
Pittsburg Cons., Nev.	£⅜	£5-16
Richmond Con. Nev.	£1	£¾
Ruby & Dunderberg, Nev	1s. 6d.	1s.
Sam Christan, N. C.	1s.	6d.
Sierra Buttes Cal.	1s. 6d.	6d.
" Plumas Eur.	£13-16	£11-16
Sonora Mex	1s.	6d.
United Mexican, Mex.	7s. 6d.	6s. 6d.
U. S. Placer, Colo.	1s. 3d.	9d.
Viola Lt., Idaho	1s. 3d.	9d.

Highest and lowest prices during the week ending August 16.

Paris. August 14.

	Francs.
Belmez, Spain	750.00
Callao, Venez.	56 75
Callao Bs, Venez.	6.50
East Oregon, Ore.	5.00
Forest Hill Divide, Cal	100.00
Golden River, Cal	350.00
" " parts.	30.00
Lexington, Mont.	125.00
parts	3 75
Rio Tinto, Spain	570 00
Tharsis, Spain	143 75

CURRENT PRICES.

These quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Acid—Acetic, ₱ 100 lbs.	$1.75@$2.00
Muriatic, 18°, ₱ 100 lbs	1.00@1.50
Muriatic, 20° ₱ 100 lbs.	1.12½@1 75
Muriatic, 22° ₱ 100 lbs.	1.37½@2.00
Nitric, 36°, ₱ 100 lbs.	4.00@4.26
Nitric, 42°, ₱ 100 lbs.	6.00@6.25
Oxalic, ₱ 100 lbs.	6.50@10.50
Sulphuric, 60°, ₱ 100 lbs	80@1.25
Sulphuric, 66°, ₱ 100 lbs.	1.00@1.75
Alkali—	
Refined, 48 p. c	@2¾
Refined, 58°	2¾@3
Alum—Lump, ₱ lb.	1¾
Ground, ₱ lb.	1¾@2
Lump ₱ ton, Liverpool	£4 17 6
Sulphate of Alumina, ₱ ton	£4 10
Aqua Ammonia—18°, ₱ lb.	4¾
20°, ₱ lb.	6
22°, ₱ lb.	6@7
26°, ₱ lb.	10@11
Ammonia—Sul., ₱ 100 lbs.	3.75
Carb., per lb.	7½@8¼
Arsenic—White, powdered, ₱ lb.	3¼@3½
Red. ₱ lb	5¾@6¾
White, at Plymouth, ₱ ton.	£12 2 6d.
Asbestos—Am., p. ton	$50@$300
Italian, p. ton, c. i. f. L'pool	£18@£60
Asphaltum—P. ton	13.00
Prime Cuban, ₱ lb.	4½@5½c
Hard Cuban, ₱ ton	$28.00
Trinidad, refined, ₱ ton	$30.00
Barytes—Sulph., Am. prime white	17@20
Sulph., foreign, floated, p. ton	19½@21.50
Sulph., off color, p. ton	11.50@14.00
Carb., lump, f.o.b. L'pool, ton	£6
No. 1, casks, Runcorn "	£4 10 0
No 2, bags, Runcorn " "	3 15 0
Bleach—Over 35 p.c., ₱ lb.	2@2½
Borax—Refined, ₱ lb.	9½@9⅝
Concentrated	7¾@8⅛
Refined Liverpool, ₱ ton	£29
Brimstone—*See Sulphur.*	
Bromine—₱ lb.	37@38
Chalk—₱ ton	75
Precipitated, ₱ lb.	4¾@5
China Clay—English, ₱ ton	13.50@18.50
Southern, ₱ ton	13.50
Chrome Yellow—₱ lb	1 @2
Cobalt—Oxide, ₱ lb.	2.60@2.90
Copper Sulph. English Wks, ton	£20@£21
Copperas—Common, ₱ 100 lbs.	70
Best ₱ 100 lbs	75@1.00
Liverpool, ₱ ton, in casks	£1 15s.
Cream of Tartar—Am. 99%	22½
Powdered, 99 p c	23
Emery—Grain, ₱ lb	4½@5
Flour, ₱ lb	2¾@3½
Feldspar—Ground, ₱ ton	15.00
Fuller's Earth—Lump, ₱ bbl.	.90@.95
Powdered, ₱ lb.	1⅝@2
Gypsum—Calcined, ₱ bbl.	1.25@1.50
Iodine—Resublimed	2.75
Kainit—₱ ton	$9.25@$9.75
Kaolin—*See China Clay.*	
Lead—Red, ₱ lb.	6¾@9
White, American, in oil, ₱ lb.	6¾@7¼
White, English, ₱ lb	8½@8¾
Acetate, or sugar of, white	12@13
Lime Acetate—Amer. brown	.95@1.00
Gray	1.75@1.87½
Litharge—Powdered, ₱ lb.	6½@6¾
English flake, ₱ lb.	9@9½
Magnesite—Greek, ₱ ton	20.00
Manganese—Crude, per unit	23@ 28
Oxide, ground, per lb	2½@6½
Mercuric-Chloride—(*Corrosive sublimate*) ₱ lb.	70@72
Mineral Wool—₱ lb.	2
Mica—In sheets according to size,	
1st quality, ₱ lb	25@$3 00
Ochre—Yellow, "B. F.," ₱ ton, f.o.b. mill	30.00
"J. L. L. S.," ₱ lb. ex dock	2½
Phosphate Rock—S. Carolina, per ton o. b. Charleston	5.75@7.00
Ground, ex vessel New York.	11.00
Canadian Apatite, lump, f. o. b. at Montreal ₱ ton	16.00
Phosphorus—₱ lb.	70@75
Plumbago—Ceylon, ₱ lb.	4@5
American, ₱ lb.	5@7
Potassium—Cyanide, ₱ lb.	30@40
Bromide, ₱ lb.	33
Chlorate, ₱ lb.	13@10
Carb. ₱ lb	4.70@5.54
Caustic, ₱ lb.	7½@8
Iodide	2.65@2.78
Muriate, ₱ 100 lbs.	1.77½@1.80
Nitrate, refined, ₱ lb.	6@8
Bichromate, ₱ lb	10½@11
Sulphate, ₱ 100 lbs.	2.30@2 35
Yellow Prussiate, ₱ lb.	17½@18
Red Prussiate, ₱ lb.	4@45
Pumice Stone—Select lumps, lb.	4
Original cks., ₱ lb.	1¾@2
Powdered, pure, ₱ lb.	2¼@2½
Pyrites—Non cupreous, p. units	10d
Quartz—Ground, ₱ ton.	14.00@16.00
Rotten Stone—Powdered, ₱ lb.	3¼@3½
Lump, ₱ lb	6@10
Salt—Liverpool, ground ₱ sack	75@80
Turk's Island, ₱ bush	25@28
Salt Cake—₱ lb.	60@62½
Saltpeter—Crude, ₱ lb.	5¼@5½
Refined, ₱ lb	6@8
Soda Ash—Carb., 48 % 100 lb.	2¾
Caustic, 48 %	2¼@2½
Soda Caustic, 60%	3.25@3.35
" 70%	3.40
" 74-76%	2¾
Sal, English, ₱ 100 lbs.	1½@1⅝
Sal, American, ₱ 100 lbs	.90
Nitrate, 100 lbs.	1.70
Strontium—Nitrate ₱ lb.	9@9½
Sulphur—Roll, ₱ lb.	1¾
Flour, ₱ lb	2@
Crude Brimstone, 2s., ₱ ton.	19 00@19 20
Crude Brimstone, 3ds. ₱ ton.	18.50@18.70
Talc—Ground French, ₱ lb.	1¼@1½
Domestic, ₱ ton	$18@$20
c. i. f. Liverpool, ₱ ton	£4 5
Vermillion—American, ₱ lb.	61
English, ₱ lb.	82@85
Vitriol—(Blue), Ordinary, ₱ lb.	5½@5⅝
Extra, ₱ lb.	7
Zinc Oxide—Am., Dry, ₱ lb.	4½
Antwerp, Red Seal, ₱ lb.	6@6½
Paris, Red Seal, ₱ lb.	6¼@7

* Spot.

THE RARER METALS.

Aluminum—(Metallic), ₱ lb.	$2.@$2.50
Sheet, per lb.	2.50
Arsenic—(Metallic), per lb.	.40
Barium—(Metallic), per gram	$4.00
Bismuth—(Metallic), per lb.	2.75
Cadmium—(Metallic), per lb.	1.00
Calcium—(Metallic), per gram	10.00
Cerium—(Metallic), per gram	7.50
Chromium—(Metallic), per gram	1.00
Cobalt—(Metallic), per lb.	6.00
Didymium—(Metallic), per gram	9.00
Erbium—(Metallic), per gram	7.50
Gallium—(Metallic), per gram	140.00
Glucinum—(Metallic) per gram.	12.00
Indium—(Metallic), per gram	9.00
Iridium—(Metallic), per oz.	7.00
Lanthanum—(Metallic), per gr.	10.00
Lithium—(Metallic), per gram	10.00
Magnesium—Per lb.	4.50
Manganese—Metallic, per lb.	1.10
Chem. pure, per oz.	10.00
Molybdenum—(Metallic), per gm.	.50
Niobium—(Metallic), per gram	5.00
Osmium—(Metallic), per oz	65.00
Palladium—(Metallic), per oz.	35.00
Platinum—(Metallic), per oz.	15.00
Potassium—Metallic, per lb.	28.00
Rhodium—(Metallic), per gram.	5.00
Ruthenium—(Metallic), per gm.	5.50
Rubidium—(Metallic), per gram	2.00
Selenium—(Metallic), per oz.	1.80
Sodium—(Metallic) per lb.	2.50
Strontium (Metallic), per gm.	.60
Tantalium—(Metallic) per gram	9.00
Telurium—(Metallic) per lb.	5.00
Thallium—(Metallic) per gram	.25
Titanium—(Metallic) per gram.	2.25
Thorium—(Metallic) per gram.	17.00
Tungsten—(Metallic) per oz.	2.25
Uranium—(Metallic), per lb.	5.00
Vanadium—(Metallic), per gm.	22.00
Yttrium—(Metallic), per gram.	9.00
Zirconium—(Metallic), per oz.	6.00

BUILDING MATERIAL.

Bricks—Pale, ₱ 1,000	3 00@3.25
Jerseys, ₱ 1,000	4.50@5 00
Up Rivers, ₱ 1000	5.00@5.50
Haverstraw seconds, ₱ 1000	5.25@5.50
Haverstraw firsts ₱ 1,000	5.50@6.00
Fronts, nominal, ₱ 1000,	
Croton	14.00@16.00
Wilmington	20.00@21.00
Philadelphia	@22.00
Trenton	@22.00
Baltimore	
Building Stone—Amherst freestone, ₱ cu. ft.	95@1.00
Brownstone, ₱ cu. ft.	1.00@1.35
Granite, rough, ₱ cu. ft	45@1.25
Granite, Scotch ₱ cu ft.	1.00@1.15
Cement—Rosendale, ₱ bbl	.85@1 10
Portland, American, ₱ bbl.	2 15@2 45
Portland, foreign, ₱ bbl.	2.40@2 50
Portland, " special brands.	2.60@2,85
Roman, ₱ bbl	2.75@2 90
Keene's coarse, ₱ bbl.	4.50@5.50
Keene's fine, ₱ bbl.	7.25@8.50
Slate—Purple and green roofing ₱ 100 ft	7.00@7.50
Red roofing, ₱ 100 sq. ft.	12.00
Black, roofing, ₱ 100 sq. ft.	4.25@5..0
Lime—Rockland, common ₱ bbl.	1.00
Rockland, finishing, ₱ bbl.	1.20
St John, com. and finish, ₱ bbl.	.90@.95
Glens Falls, com. and fin., ₱ bbl.	.85@1.10
Labor—Ordinary, ₱ day	1.50@2 00
Masons, ₱ day	4.00
Plasterers, ₱ day	4.00
Carpenters, ₱ day	3.50
Plumbers, ₱ day	3.50
Painters, ₱ day	2.50@3.50
Stonesetters, ₱ day	3.50@4 00
Tilelayers, ₱ day	3.50@4.50
Bricklayers, ₱ day	4 00

THE ENGINEERING AND MINING JOURNAL will thank any one who will indicate any other articles which might with advantage be quoted in these tables or who will correct any errors which may be found in these quotations.